

THE  
HISTORY  
OF THE  
Propagation & Improvement  
*John Hamond* of *2 Oct 1722*  
VEGETABLES  
By the concurrence of  
*ART and NATURE:*

Shewing the several ways for the Propagation  
of Plants, usually cultivated in *England*, as they are  
increased by Seed, Off-ssets, Suckers, Truncheons,  
Cuttings, Slips, Laying, Circumposition; the several  
ways of Graftings and Inoculations; as likewise the  
methods for Improvement and best culture of Field,  
Orchard, and Garden Plants, the means used for re-  
medy of Annoyances incident to them; with the  
effect of Nature, and her manner of Working upon  
the several Endeavors and Operations of the Artist.

Written according to OBSERVATIONS  
made from Experience and Practice.

*The Second Edition much Enlarged.*

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By Robert Sharrock, Fellow of New-College.

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## OXON:

May 22.

1671.

### Vice-Cancellor.





To the Honorable *Robert Boyle Esq;*  
*The most worthy Pattern of true Honor,*  
*And Learned Promoter of true Science.*

*SIR,*

IT is a saying in the Civil Law; *That a thing which is any Mans own, cannot be made more his by any new Act or Deed:* The consequence of which, is, that the Dedication of this Peice to you will be meerly Nugatory, since by all right it is already yours. For it is not long since I imagined no more being either Author, or Compiler of any matter on this Subject, then of doing any other thing which I have neither fancy nor fitness to. But you were pleased to judge me able, and (which obliged me to this task) to propose it unto me as your desire that I should make an Essay of that ability, in writing somewhat even on this subject, that might be of Philosophical and common use. To have questioned your judgment herein, might have stained me with too much arrogance, and to have been careless of your pleasure, with unworthiness and want of

## *The Epistle Dedicatory.*

good Manners. Remembring therefore those respects I owe to Honor, Learning, and such persons as study its advancement and promotion, I could not deny this poor endeavour, the product of which arising originally from your own act, I thought fit should be delivered over to your pleasure, since to you, as its primary cause (which is its prime commendation) it ought to belong.

And Sir, If it may not be troublesome unto you to receive some brief account of this action, and the Fortunes which happened to me in pursuance of your satisfaction therein, you will give me leave to acquaint you, that it having been your Honours express desire, that this Piece might extend as far, and be as comprehensive and full, as my present Experience, Knowledge, and Recollection of the matter of Vegetable Propagation should permit: I gave my self the trouble to run over with my eye, all Books I could procure of these subjects, not intending to trust any, but thetely to be put in mind of the particulars, concerning which, I had no reason to have a Register ready in my head. Here first my fortune

## The Epistle Dedicatory.

ture was to find a multitude of monstrous untruths, and prodigies of lies, in both Latine and English old and new Writers, worse in their kind then the stories in Sir John Mandevell's Travels, or in the History of Fryer Bacon and his Man Miles; or else what may be more ridiculously removed not only from truth, but from any semblance thereof. And which moved me most at this very season, when we esteemed the World to be now awaked, I found in the Shops Authors newly set forth (I hope against their own wills) who seriously professed to have *made a select choice of Experiments* of this nature, and to report nothing, but what from observation and experience they have certainly found true, yet deserving not to have the credit of *Wecker* and *Porta*. Professions in such Papers, which seem to me at no time proper, but when the persons credits, together with their Books, are joynly to be set to sale. You easily believe that I am not free to follow these Examples, for then, first, I must abuse your Noble Name, by inscribing it to a most unworthy Discourse, and then (which is too common a fault) traduce as many Readers, as ignorance and simpleness of nature hath made credulous. But

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But as to those Authors, in whose relations I found any thing of truth, I have done them this right, That where ever I could relate an Operation or Experiment in their words, with truth and fitness, I spared to coyn new (desiring to supplant no Author in his credit, nor to purloyn his reputation) though I had learned the truth of the same thing from the testimony of my eyes: Having indeed some quarrel at the fashion of ordinary Writers, who study in nothing to benefit Learning, but by giving new words to old matter.

I have left out none of the Heads proposed in the Catalogue, which I presented you with, a year since, except the last, which you desired might shew the methods and ways of keeping useful Vegetables without putrefaction, and the preparing them with their several parts and products for humane use. This at present I thought necessary to forbear, for I found the matter too much for one Chapter, and my leisure too little to make a Book thereon: nor durst I esteem my Observation such, as might enable me to write an adequate Treatise on that Subject, which reaches in compass the largest, and

## The Epistle Dedicatory.

and as I firmly believe (however the Animal and Mineral Kingdom abound with great and potent Medicines) not the worst part of the *Pharmacopea*, and many particulars beyond; but rather think fit to employ my self some more years in the Experience and Practise of Preparations, and take the pains of collecting and trying such intelligible and probable processes as shall come to my hand, either reported heretofore, or used now, especially in our Nation, for fitting matters to Alimental, Medical, and Mechanical use, before I shall imagine to have the least hand in that History, which may as well be learn'd by such as are concern'd to know it, from Modern Dispensatories, and other novel Writers. But the perfection of that History, with correction of processes capable of amendment, is, in my estimation, a design and work worthy of the Care, Patronage, and Governance, and fit to be carryed on by the interest, if too tedious for the Pen and Pains of your Honor.

*Not*

As to the form and composition of matter under those Heads, I must make it a particular business to beg your Pardon; for I find it even in my own judgment exceeding

## *The Epistle Dedicatory.*

tude, and it could be no otherwise, when the Revise of the Pres, was, for a great part, the first review made of my own Writing; and indeed, the whole piece in every part seems destitute of beauty, and without any thing of great worth, value, or nobleness. For I find, that the operations themselves, and other matters that do belong to the subject in hand, and so capable to come under this History, are for the most part common, and devoid of curiosity: Nor durst I embellish their plainness with Stories taken from our Learned and Profound Writers of Natural Magick, because I intended, as no very imperfect, so likewise a true Inventory of what the power of man, at this present time, on this subject, is, with the Co-operation of Nature, able to produce: For these reasons, and perchance because of another peice then under my hand, to which I had more propense affections, I was exercised in this writing, not without some reluctance and untowardness of mind; and it surely had proved to me a peice of meer drudgery, had not the hope of giving you satisfaction, and making this a testimony of my obeysince, and humble submission to your

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your Judgment and desires inspirited me, and let a lightfomness into my thoughts. What I have written, I shall not commend, by any Prefaces, to any Reader, though I shall give him here some things new, and of my proper Observation: I know that many, by their own Interest and (that great power) Temporal Profit, will be tempted to give it the reading. Neither shall I, in imitation of some Modern Alchymist, for ostentation, bid them goe, and by the improvement (which I hope may be some ~~to~~ most Readers) be charitable ~~to~~ the poor: Hoping, that for Gods sake, they will rather (as they are bound by Obligations infinitely more high) be thereto moved; nor need I excuse my self to them for any deficiency in this Writing, you having ingaged your self to be the proprieter thereof, and by your acceptance of this poor piece, greatly obliging,

*SIR,*

*Your Honors unfeignedly Devoted in all  
humble and affectionate observance.*

**R. SHARROCK.**



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THE



T H E  
H I S T O R Y  
O F  
Artificial Propagation of Plants.

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C H A P. I.  
*THE PREFACE.*

**T**He Illustrious and Renowned Lord Bacon, in his discourse concerning the advancement of Learning, reckons it among the Deficients of Natural History, *That the Co-operation of Man, with Nature in particulars, hath not been observed; and that in those Collections which are made of Agriculture, and other manual Arts, there is commonly a neglect and rejection of Experiments, familiar and vulgar, which yet to the interpretation of Nature, (and which I shall add, general profit,) do as much, if not more conduce, than Experiments of a bigger quality.* The same noble Person, in his

partition of Philosophy, complains of the want of an Inventory of what in any subject, by Nature and Art is certainly, and may be undoubtedly wrought. I believe his Lordship hath had many of his mind in former, hath now, and is likely to have in future ages; For amongst those few Writings extant on these Subjects, some prove altogether useles; as being so full of their natural Magick and Romantick Stories, that we know no more what to credit in those Relations, in the Natural, than what in civil History we may believe of King *Arthur*, *Guy of Warwick* in ours; or of *Hector* and *Priam* in the *Trojan* Story: Others elevated in their Fancies, write in a Language of their own, addressing their Discourse to the Sons of Art, speaking rather to amuse, than instruct, and prove like blazing Stars, that distract many, and direct few.

Many of those who would write for Universal Instruction, either know the things that might make up the matter of their History, but want the skill to draw up such an Inventory, as my Lord *Verulam* requires, to common Tradesmen and Artisans; or else indeed are learned enough to draw up the writing, but out want the knowledge of most of the particulars therein to be ingrost; which is commonly the case of such of us as have pretensions to Scholarship.

I being necessitated by my obligations and respect to a Person truly Noble, to give some account

account of the particular effects of Man, co-operating with nature, in the matter of our English Vegetables, as they are improved by Husbandmen and Gardiners, desire to undertake no more, but to give a sincere endeavour, That the way of the Artist be set down, and the effect of Nature thereon ; in the first of which, I intend my directions so plain, as if appointed for the instruction of some Artists rude and untaught Apprentice : and in the second, if not so homely, yet as easie and evident ; being a little disgusted with any thing intended for the use of Philosophy, when overgarnished with Rhetorical Tropes, which like Flowers stuck in a Window for whatsoever intended, (either cheat or ornament) certainly create a darkness in the place. *Bebe-menical, Paracelsian*, and such Phrases as many Alchymists use, I must for the same reason avoid.

In the drawing up the Inventory, I will study that it may be true in all parts, and not to mingle according to the example of *Pliny, Wecker, Porta*, and many more, both Latine and English Writers, any false relation, without its distinguishing Character ; and if it be not perfect, it shall be for want of skill, or present remembrance of particulars, and if it be accepted, *cum protestatione de addendo*.

#### 4 The ways by which Plants are propagated.

Num. 1. How many ways of Propagation there are; The division of them into their species.

Of Natural Propagations, and seminal Principles latent from the Creation.

The wayes of Propagation, are either Natural or Artificial. We call those wayes Natural, in which there is most of Nature and little of Art, those artificial wherein the Artist is more assistant in applying agents and patients for the production of the desired effect. For even in the wayes of Propagation that are most artificial, there is more of Nature than Art. Industry and Art may bring Materials, and place them fitly for it, but Nature works them. And therefore, as one sayeth, it is the great Art of Man to find out the Arts of Nature. There are many Methods of Nature that are secret; Many of her secrets have been found out, and are followed by Artists to the Improvement of the Treasures and Powers of Man.

Of things propagated Naturally, Virgil speaks,

*Sponte sua que se tollunt in luminis Auras,  
In secunda quidem sed late & fortia surgunt.  
Those trees, which of themselves are fustered,  
Unfruitful be, but strong, and fair they spread.*

This is our unhappiness, that whereas before Mans transgression, the Earth spontaneously, and

and without humane Industry and Culture, brought forth all manner of useful Plants, according to the command of God, Gen. 1. 11. Now since the Curse, it bringeth forth of its own accord onely those that are less useful, and the rest, not without the Art, the sweat of Man: *Totus Mundus, saith a Rabbi, tantum propter hominem conditus est, postquam igitur homo peccavit diminuta fuit terrae perfeccio.* We cannot but see the truth of Gods prediction; That the Earth of its own accord should bring forth Thorns and Thistles, *and that Man in the sweat of his face should eat his bread.* For we see that Plants of great use in Human life, are not brought to perfection without great Industry. There are indeed some that the Earth still brings forth spontaneously without seed, without off-sets or layers, or any other of those artificial wayes of propagation. But what are they but Thorns, Briars, Thistles, and other rude, imperfect, and almost useless Plants. Thistles, though they have a perfect seed, yet the Earth will bring them forth without it. The same thing cannot be said of Wheat, or other useful Plants. Ferne and Heath, Mushroom and Moss, and some other of like Natures arise also without seed, and so might Lilies and Roses still have done, had not the production of better Plants been made more difficult by that Curse of God which man drew upon the Earth. It is the Opinion of the best Philosophers and Divines,

*X Lilies & Roses by Will  
doe in y<sup>e</sup> hotter Climates*

## 6 The ways by which Plants are propagated.

Jewes, Heathens, and Christians, that in the Method of the Creation God first made a Chaos, in which were the principles and seeds of all beings, Plants as well as others. *Moses* telleth us, that God created every Plant of the field before it was in the Earrh, and every herb before it grew, *Gen. 2. 5.* If you ask when that was, the Learned tell you, that it was in *Principio prime diei*, when God is said to have created the Heaven and the Earth, that is the Mass of Heaven and Earth; Containing the substance of them, and of all creatures to live in them, mingled together in a confused Chaos: The Earth was not then perfectly fashioned as it is now. For it is said in the following words, That *the Earth was without form, and void*; and *Fagius* hath this critical Observation on the Text, that the Particle **וְ** in the phrase **וְהַבָּה** detecteth that it was not the Earth in form, but the substance of the Earth that was then said to be created: and *Munster* out of the Rabbins telleth us, that it was *Moles Terra & Aqua*, that was then created, in which were the principles of all Heavenly and Earthly Bodies also. *S. Auziine* frequently hath exprest himself for the same construction, so *lib. 1. De Genesi ad literam, cap. 4.* he giveth us this paraphrase of the Text. *In principio Deus fecit celum & terram. Hoc autem quod celum & terra dictum est terra erat invisibilis & incomposita & tenebra super abyssum: id est, quod celum & terra appellatur*

est, *Materies erat confusa quedam, de qua Mundus*  
(qui duabus maxime partibus celo scil. & terrâ  
constat) *digestis Elementis & acceptâ formâ fabri-*  
*caretur.* That is, whereas it is said, that in the  
beginning God made the Heaven and the  
Earth; It is to be noted, that that which is  
there call'd Heaven and Earth, was invisible,  
indistinguishable in its parts, incomposed,  
and darkness was upon the face of that Chaos:  
in short, that which was call'd Heaven and  
Earth, was the matter of which the whole  
world, whose chief parts are Heaven and  
Earth, were to be made, which same matter  
He therefore frequently calleth *Semen Celi &*  
*terra.* Vide lib. 1. *De Genesi contra Manicheos,*  
cap. 1. & cap. 6. & 7. *Informis illa Materia, quam*  
de Nibilo fecit Deus appellata est primo *Celum &*  
*Terra;* & dictum est, *In principio Deus fecit Cælum*  
*& Terram, Non quia jam hoc erat, sed quia jam*  
hoc esse poterat, *Nam & Cælum scribitur posse*  
*faciūm.* *Quemadmodum si semen Arboris confide-*  
*rantes dicamus ibi esse radices & Robur & Ramos*  
*& folia & fructus, non quia jam sunt sed quia inde*  
futura sunt: sic dictum est in principio Deus fecit  
*celum & terram quasi semen celi & terre cum*  
*confusa adhuc esset celi & terre Materia.* That  
matter without form which God made out of  
nothing [he means, as he declares in the 4th  
Chapter, the same which the Greeks call'd  
their Chaos] was called first the Heaven and  
the Earth. And it is said in the beginning,  
God made the Heaven and the Earth, not be-

## 8 The ways by which Plants are propagated.

cause it was such already, but because it might be so. For the Heaven is said to be made afterward, as if upon the consideration of the seed of a tree, we should say, that there is a root, and stock, and boughs, and leaves, and fruit, not that they are such already, but may become such, so is it said that in the beginning God made the Heaven and the Earth, that is as it were the seed of the Heaven and the Earth, when as yet the matter of them lay together mixt and confused.

And the Philosophers and Poets, either had the same doctrine by Tradition, or if they read the books of Moses, thus also they understood them. So *Linnaeus*,

*Ἐπει τοι τοι χώρας οὐκ εἴσιν οὐδενά παρόμια.*

*There was a time when all things lay together mixt. — And Euripides.*

*Οὐαρεῖ τι γάλατ' οὐ μόρρα μία  
Ἐπειδ' ἵχωρίδας αὐλάλοις δίκα  
Τίκτουσι Πάντα· καρκίδους εἰς τάρο  
Δίκτη, Πετρία, Θήρας, δὲ τὸν Ἀλμυτρίου  
Γίγαντας τὰς θεάσαν.* Eurip. in *Melanippe*.

*There was one face of Heaven and Earth, but when  
These from their Chaos sever'd were,  
Plants, Beasts, and Foul, and Fish appear,  
And last of all the Nobler off-spring, Men.*

And *Apollonius in Argonauticus*.

*Γαῖα οὐ δοκεῖται οὐδενά  
Τὸ πεῖρις εἴτε αὐλάλοις μήδη συναρρέεται μόρρη  
Νέκταρος οὐδενός δίκτυος εἴμεστι εκατόν.*

*The*

The ways by which Plants are propagated. 9

*The Earth, the Heaven, and the Sea,  
First in one figure mixed lay,  
Dark was the Chaos, blind the strife,  
Which parted, all things came to life.*

But none of them have more plainly or fully  
exprest this then *Ovid* in his *Metamorphosis*.

*Ante mare & terras & quod tegit omnia, celum,  
Unus erat toto Naturæ Vultus in Orbe,  
Quem dixerat Chaos, rudit indigitaque moles,  
Nec quicquam nisi pondus iners, congestaque eodem  
Non bene junclarum discordia semina Rerum.*

*The sea, the earth, all-covering Heaven unfram'd,  
One face had nature, which they Chaos nam'd :  
An undigested lump ; a barren load,  
Where jarring seeds of things ill-joyn'd aboade.*

And *Valesius* upon that Text of *Ecclesiasticus*,  
*Deus qui semper est, fecit omnia simul.* *Verè*, saith  
he, *fecit omnia simul in illo mundi Initio, non ta-*  
*men omnia eodem modo sed alia quidem ipsa per se,*  
*alia in suis principiis.* Truly God did make all  
things in the beginning of the world, but he  
made not all things after the same manner,  
for some he made actually self-existent, other  
things he made also that were then latent in  
their seminal principles. The principles and  
seeds of all things therefore being in this  
Chaos, and these principles and seeds, in the  
style of *Moses*, bearing often the names of the  
things themselves, as is above discours'd ;  
You see how that Text of *Genesis* is true,  
where

## 10 The ways by which Plants are propagated.

where it is said, that God created every Plant of the field before it was in the Earth, and every herb before it grew. Namely the principles and seeds of them were created in the first Chaos. And to this first Creation of Plants before they grew, must we have recourse for the cause of all those spontaneous productions of Vegetables, such I mean as spring of their own accord without seed, or any other of the usual means of Propagation. And surely all other more useful Plants had either sprung up spontaneously, or at least had been propagated with less difficulty, the seeds would have sowed themselves, and the earth have open'd its bosome to receive them, had not Man merited by his transgression that decree of God, that the earth of its own accord bring chiefly thornes and thistles, and that in the sweat of his face he should eat his bread. And surely there was some Tradition even of this Curse also among the Heathen.

— *Pater ipse colendi*

*Hand facilem esse viam voluit, ----*

*Nor was Jove pleas'd, tillage should easie be.*

Virg. Georg. I.

And *Hesiod* telleth us, that in Agriculture the Gods have appointed work, not idleness for Man, and that he must beg his bread, or get it by his labour. 'Επι. η μερ. Β. Β. Β.

Seeing therefore we cannot hope to enjoy the full benefits of the Vegetable Kingdome, and yet to live in a perpetual Sabbath or cessation

from

from labour, nor that it should be with us as it was with our first Parents, when to speak in the phrase of the Poet,

*Immunis, rastroque intacta, nec ullis  
Saucia vomeribus, per se dabat omnia Tellus.*

*The yet-free earth did of her own accord  
(Untorn with Plows) all sorts of corn afford.*

We must consider how to sollicite Nature so, as to make it answer our expectations, and to advance the wayes of propagation by Art and Industry.

The end of the Artist is to find out the Arts and ways of Nature, and so to Propagate and Improve: To propagate, is to multiply the individuals of each kind: And to improve, is to bring them, being propagated, to a more then ordinary excellency and goodness. The ways of increasing the particulars of each kind, are, 1. By Seed, 2. By off-set, taken from a Mother-Plant. 3. By laying the Branch of a growing Plant down into the Earth. 4. By bearing up a Soil to it. 5. By Stems set without roots. And lastly, By the various ways of grafting and insitions.

Concerning all these, as likewise the preservation and melioration of things propagated, I shall endeavour to enumerate what Plants may be increased by each of these ways, and to shew how the operation in each may be performed, and what the product is that by nature thence ordinarily ensues: Definitions are

## 12 The ways by which Plants are propagated.

are hopeless in this matter, useless too, and it might be harmful: If I should define Sowing, to be casting of Seed into the Earth, in such manner, and at such time, when in the surface of the bed the earth would so ferment, as might be proper to the explication and further germination of the Seed and increase of the Plant, there might a world of controversies arise about the particulars therein contained; and yet all that is there would be useless, till the particular Plants, and the manner of the operation, and time required to the sowing of their Seeds be first declared: I shall therefore wave all such endeavours, and hasten to what may rather prove for use than pomp.

### Num. 2. That Nature gave a specimen of this way of Propagation.

Nature surely of this first and greatest species of Propagation, though it would not undertake the whole work, yet gave us the first Hint. So *Lucretius lib. 5.*

*At specimen Sationis* —

*Ipsa fuit rerum primum Natura creatrix,  
Arboribus quoniam Bacce, glandesque caducæ  
Tempestiva dabant pullorum examina subter.*

— *ibus Natures All-creating Hand  
Gave the first Hint to Men of Sowing land;  
For fruits and Akorns dropping ripe, did bring  
Forib Timely sprouts for the succeeding Spring.*

But

But seeing that this species of Sowing will not suit with all Plants, it will be expedient to annex a Catalogue of those Plants that Experience hath taught us here in *England* to propagate this way.

A Catalogue of Plants that may be encreased by Seeds.

Aconite.	<i>Aristolochia.</i>
<i>F. Adonis.</i>	<i>Ash.</i>
<i>Allianders.</i>	<i>Asparagi.</i>
Alkanet.	<i>Asphodels.</i>
<i>Alaternus.</i>	<i>Avens of all sorts.</i>
<i>Alliaria.</i>	<i>Balm Apple.</i>
Almonds, the bitter from our <i>English</i> Fruit, serving for his own kind, or to make stocks for A- precots & Peaches.	<i>Balsamia.</i>
Ammi.	<i>Basil.</i>
<i>Amaranthus.</i>	<i>Balm.</i>
<i>Angelica.</i>	<i>Barberies.</i>
<i>Anemones.</i>	<i>Bay-Trees.</i>
Aprecots.	<i>Beesb.</i>
Aparine.	<i>Eeans.</i>
Apple-trees of all sorts,	<i>Bears-ears.</i>
Apples of Love.	<i>Eetony.</i>
<i>Artemart.</i>	<i>Bell-flowers.</i>
<i>Armerias.</i>	<i>Beets.</i>
<i>Archangels.</i>	<i>Bistort.</i>
	<i>Bitter Almonds.</i>
	<i>Blice.</i>
	<i>Blew-bottle.</i>
	<i>Bloodwort.</i>
	<i>Bryonies.</i>

*Bulbous*

Bulbous Violets.	The Seeds of <i>Clematis</i> ,
Burrage.	but it comes not up till the second year.
Buglossc.	
Burdock.	<i>Coleflower</i> .
Burnet Sassafrage.	Corn of all sorts.
Burnet.	<i>Corneflag</i> .
Burrs.	<i>Coronopus Ruellii</i> .
Buckthorn.	<i>Comfrey</i> .
Bullets of all sorts.	<i>Corianders</i> .
Cabbage Plants.	<i>Columbines</i> .
Campions.	<i>Convolvulus major</i> , mi- nor, and other Bind weeds.
Carnations.	<i>Cornfallet</i> .
Calamint.	<i>Coronopus</i> .
Camomile.	Most sorts of <i>Cowslips</i> .
Caucalis.	<i>Crown Imperial</i> .
Carrots wilde.	<i>Cranes-Bills</i> .
Carrots.	<i>Crowfoot</i> of most sorts
Caraway.	<i>Cucumbers</i> .
<i>Carduus Benedictus</i> .	<i>Cumin</i> .
Centory.	<i>Cyclamens</i> .
Celandine.	<i>Cypræ</i> from out-land- ish seed.
Chickweeds.	<i>Dandelion</i> .
Chondrillas.	<i>Dames Violet</i> .
Chervil.	<i>Sonic Dayfies</i> .
Cherries.	<i>Diers Weed</i> .
Chestnuts.	<i>Dittander</i> .
The Cornelian Cherry.	<i>Divels-bit</i> .
Cichory.	<i>Dittany</i> .
Citrulls.	<i>Dill</i> .
Cicbes.	
Claries.	
Coleworts.	

Docks.  
Dogs-bane.  
Earth-nut.  
Egrimony.  
Elecampane.  
Endive.  
Epatica's.  
*Eupatorium cannabinum.*  
Evergreen Privet.  
Ewe.  
Feaverfew.  
Fennel-flowers.  
Fennel.  
Fenugreek.  
Figwort.  
Fig-trees.  
Fibberds.  
The Firre-Tree.  
Some Flags.  
*Flowers-de-Luce.*  
*Flos Adonis.*  
Flaxes.  
Fleabane.  
Fluellens.  
Foxgloves.  
Frittelaries.  
French-Mallows.  
Fumitory.  
Garlick.  
Garden-cresses.  
Germananders.  
Ginny.

Gilly-flowers.  
Globe-flowers.  
Gourds.  
Most of our English  
Grass; to this end,  
Husbandmen use hay  
dust (as they call it,  
in which lie the seeds  
of their grass) to sow  
upon such Grounds  
as they mean to turn  
from fallow into Pa-  
ture, or where they  
would have the grass  
grow thicker.  
Grain of all sorts.  
Groundsel.  
Groundpine.  
Gromwell.  
Hawkweeds.  
Hartwort.  
Hawthorn.  
Haselnuts.  
Henbane.  
Hemp.  
Hellsbores.  
Hercules his all heal.  
Hyacinths.  
Holy-oke.  
Horse-radish.  
Horned-Poppy.  
Hony-wort.

16 Plants propagated by Seed.

<b>Horebounds.</b>	<b>Marigolds.</b>
<b>Hounds-tongues.</b>	<b>Marshmallows.</b>
<b>Holyoke.</b>	<b>Masterwort.</b>
<b>Honeysuckles.</b>	<b>Maple.</b>
<b>Holly or Holme.</b>	<b>Malacotones.</b>
<b>Hypericum.</b>	<b>Melons.</b>
<b>All Hyssopes.</b>	<b>Melilot, and its kinds.</b>
<b>Indian Pepper.</b>	<b>Medlars.</b>
<b>Ironworte.</b>	<b>Mercuries.</b>
<b>Juniper.</b>	<b>Molyes.</b>
<b>Kidney-beans.</b>	<b>Monkshood.</b>
<b>Knapweed.</b>	<b>Motherworte.</b>
<b>Knot-grasse.</b>	<b>Mustard.</b>
<b>Ladysmocks.</b>	<b>Muscipula.</b>
<b>Lamb-lettuce.</b>	<b>Mulleines.</b>
<b>Lark-spurs.</b>	<b>Mulberries by Seed from hotter climates than our own ; for our heat ripens not the seed ordinarily, yet I have seen at M. Stephens of Lang- ford a Case of young Mulberry - trees all raised from English seed.</b>
<b>Levander.</b>	<b>Mirtles likewise.</b>
<b>Langdebeefe.</b>	<b>Narcisses.</b>
<b>Leeks.</b>	<b>Dead-Nettles.</b>
<b>Some Lillies, though but few.</b>	<b>Stinging-Nettles.</b>
<b>Lycnis Calcedonica.</b>	<b>Noli-me-tangere.</b>
<b>Linum umbellatum.</b>	<b>Nightshades.</b>
<b>Lovage.</b>	
<b>Lupines.</b>	
<b>Marjoranes of all kinds</b>	
<b>Mandrakes.</b>	
<b>Mastique.</b>	
<b>Common Marygolds.</b>	
<b>Mallows.</b>	
<b>Marbleflower.</b>	
<b>French and African</b>	
	<b>Nigella.</b>

<i>Nigella.</i>	Ever green Privet.
<i>Oke.</i>	<i>Pulsatillas.</i>
<i>Oke of Paris.</i>	<i>Purflane.</i>
<i>Onions.</i>	<i>Quinces.</i>
Some of the <i>Orchis</i> of stones.	<i>Radish.</i>
<i>Orach.</i>	<i>Ragwort.</i>
<i>Orpines.</i>	<i>Rampions.</i>
<i>Paronychia.</i>	<i>Radix-cava.</i>
<i>Pancies.</i>	<i>Reeds.</i>
<i>Peucedanum.</i>	<i>Ribwort.</i>
<i>Parsley.</i>	<i>Rosemary</i> by Out-land- ish-seed, sometimes by our own.
<i>Parsnips.</i>	<i>Roman Nettles.</i>
<i>Panax Herculeus.</i>	Some <i>Roses</i> , the Flow- er being not gather- ed, but left to seed.
<i>Pellitory.</i>	<i>Rocket.</i>
<i>Pennywort.</i>	<i>Rushes</i> of many sorts.
<i>Peonyes.</i>	<i>Rue</i> of all sorts.
<i>Pease.</i>	Some of the <i>Saffrons</i> , and <i>Mede - Saffrons</i> , whose seeds lyes un- der the earth.
<i>Pease everlasting.</i>	<i>Satyrions.</i>
<i>Pears.</i>	<i>Savory.</i>
<i>Peaches.</i>	<i>Sabina baccifera.</i>
<i>Periclemenum.</i>	<i>Scorpion grass.</i>
<i>Philarbæa.</i>	<i>Scurvy grasse.</i>
<i>Pinks.</i>	<i>Scorodonia.</i>
<i>Pimpernel.</i>	<i>Scabiose.</i>
The Pitch-tree.	<i>Scorzoneca</i> , but it comes
<i>Plums.</i>	
<i>Plantains.</i>	
Wild & garden <i>Poppies</i> .	
<i>Pondweed.</i>	
<i>Pompions.</i>	
<i>Primroses.</i>	

18 *Plants propagated by Seed.*

comes up with some difficulty.	ter and Summer sorr Thistles.
<i>Seseli ethiopicum</i> , or Hartwort.	Tobacco.
<i>Sesamoides</i> .	Thlaspies.
<i>Shepbeards purse.</i>	Toad-flaxes.
<i>Skirrets.</i>	<i>Tragopogon</i> .
<i>Sloes.</i>	Trefoile, and its kinds.
<i>Smalladge.</i>	<i>Tulips</i> .
<i>Sneezewort.</i>	Turnips, and all its wilde kinds.
<i>Snapdragon.</i>	Tufsan.
<i>Sowthistle.</i>	<i>Venus Looking-glass.</i>
<i>Sorrels.</i>	<i>Vervain.</i>
<i>Spiderwort.</i>	Vetches.
<i>Spinach.</i>	Violets.
<i>Spurges of many kinds.</i>	Vipers-grass.
<i>Spignel.</i>	Virgine-bower.
<i>Stickwort.</i>	<i>Umbilicus-Veneris.</i>
<i>Starre-flowers.</i>	Vines from Out-landish seed.
<i>Stockgilliflowers.</i>	Water-betony.
<i>Starrewort.</i>	Water-lilly.
<i>Flowers of the Sun.</i>	Wallnuts.
<i>Sword-flags.</i>	Winter-cress.
<i>Swine-cresse.</i>	Winter-cherries.
<i>Swallow-wort.</i>	Willow-weeds.
<i>Sycamores.</i>	Woolfs-bane.
<i>Tarragon.</i>	Wormwood.
<i>Teasels.</i>	Woodroof.
<i>Terre-glaudes.</i>	Wood-sorrel.
<i>Thorney Apples.</i>	Woad.
<i>Thorough-wax.</i>	
<i>Thyme, both the Win-</i>	

101100

There

There is a great controversie concerning *Harts-tongue*, *Maydenhair* of divers sorts, *Scolopendrium*, *Fernes*, and other Plants, whose property is to have the back of the leaf lined with a brown dusty substance, whether this substance be a seed, or onely the particular mole, and character of Plants of that nature.

I dare not disbelieve this (when perfectly ripe) to be a true seed, because divers, very experienced persons (as Mr. *Bobart* particularly) affirm, that they have seen the small Plants, or Seedlings, at a distance all round the Mother-plant grow up as is ordinary from shed seed of other plants, and by *Miscroscopes*, the likeness of this dust to other seeds is apparently seen.

### Num. 3. *The Seasons of Sowing.*

First, the most natural time of Sowing, is that which Nature it self follows, (viz.) when the seeds of their own accord fall into the ground.

At this Season may be sown all stony seeds that can endure the Winter, as Cherries, Plums, Peaches, Apples, Pears, likewise all Nuts, Buckthorne, Ash, Oke, and most wild English Plants, though they may as well be sowed any time before the Spring.

The seed of hot, and sweet herbs, as

Thyme, Savory, Marjerome of some kinds, and other hot hearbs, if they get any reasonable strength and growth before the frosts, do well enough; also Muscabious Angelica seed, Scurvey-grass, and the seeds of Bears-hears, Aniseed, Fritellary, Crocus, Corneflags; and, for ought I know, all the rest of Bulbous-rooted-flowers: So Tulips and Anemonies thrive best, and come soonest, being sowed after the seeds are gathered, or in Autumn: For many October does well, but care must be had to keep tender Plants from Frosts and the violence of Winter weather, when they are but young from the Seedlings. If you doubt the nature of any seed, divide your quantity, and sow some of it in the Spring, some before the Winter.

At this time also must be sowed divers Plants, because that by experience it is found, that being sowed in the Spring, they wil not grow, or at least not that year: Of this kind is Myrrhis, or sweet Chervil, and all Rubarbs, which easily grow then, but faile being sown in the Spring.

The mistake of the time has made some admire, that when they with care had sowed Angelica seeds several times together, it never grew; on the contrary, the Seed being shed, would grow in any place, never so uncouth or stony; nay even carried away by the water, would grow where ever it was Lodged in the banks, and that well and lustily; whereas

whereas the reason of the difference was in the season, for the laborious Artist kept the seeds till Spring, and his Delay was his hindrance, whereas better instructed Nature would have committed them to the Earth many months sooner. 'Tis a true Proverb, *Properata satio solet sape decipere, sera semper.*

Wheat is sowed generally about *Michaelmas* or within a Month before, and from that time until *Allhallowtide*, sooner or later, according to the lightness or warmnes\$ of the ground. Some sorts of Barly also there are that will endure the Winter, as the *Hexastick* particularly, or Barly that carrieth six Rowes of Grain in the Ear, which *Gassendus* mentions to be an usual grain in in *Champaign of France*, and which I have seen ordinarily growing in *England*: But it requireth a good soyl, and must be sowed about *Allhallowtide*: I take it that it would be a great improvement to sow it in our richest new broken grounds. It will not agree with a soyl that is hungry.

*Cornesallet* is usually sowed in the beginning of *September* in good earth, the seed being sound and new, and it will be cut by the next *March* for sallets, it flowers in *April*, and the seed is ripe in *June*, if you let the seed scatter, it will grow naturally.

Some seeds are sown at the breaking of the Frost, and in the very first beginning of Spring; and that upon a hot bed, for the

greater security and speed of the Plant to be propagated: So the early Radish, the Sensitive Plant, Maracoc, Jacobaea, Balm-Apples, French-Marygolds, Muskmelons, all Cucumbers, African-Marygolds, the Marvail of the world, the Indian Cress, or yellow Larks-heel, Lettices that may be had early; Amanthus and divers others of like kinds.

The hot Bed is made with horse-dung, laid four, five, or six foot high, and of the same breadth commonly, increasing or diminishing the quantity of the dung (which uses to be fresh, as it comes from the Stable, mingled with stale Litter, Hay, &c.) according as you would have the heat greater or less, upon which Bed of dung you lay fine mould, five fingers breadth in deepness, or thereabouts, compassing it round with hay-bands which keep the Dung together, and hinder the steaming out of the heat by the sides; then staking it up with stakes, and putting bended sticks in the manner of a very low roof, to hold up tilts that are put to secure the Plants, the hot bed is compleatly finished. Those that use Cap-glasses, or Casements made to lye upon a frame over their beds, nevertheless must use, though not tilts, yet covering with straw, litter, or the like.

Some use only Barly-straw, or Barly-straw and Bran for their hot beds, and think them best both for raising the Annual plants and Melons also, because Horse-dung gives a rank-

rankness to all esculents, and besides forceth the Germination too soon, and doth not continue that heat by which the Plant was forced up.

Asparagus and Chervil are best sown in Winter, before Christmass, or shortly after, and in the beginning of Spring, without any hot bed.

In *February*, or afterwards, are sown Parsnips, Leeks, Onions, Aniseeds, Carrets, Radish, Spinage, Larks-spurs, Marygolds, Cærefolium, Corn-sallet, and with the first of these the Rounseval pease. For as *Virgil* truly writeth,

*Vere fabis satio; tum te quoque, Medica, patres  
Accipiunt fulci.* Virg. Georg. I.

*Beans sow in spring: then Clave-grass rich  
(earth takes.*

Colliflowers and Cabbages in the middle of *February*, Muskmelons somewhat after, or then for a venture. 'Tis observ'd by all I have enquired of, that the leſs of the Winter the Cabbage or Collyflowers feels, the more ſubjeſt 'tis to Caterpillars. In *March* or *April* (or according to ſome with us, from the beginning of *February*; or if the Frosts break, any time in *January*) Carrot, Radish, Tobacco, Fennel, Cresses, Skirrets are ordinary ſownen.

In *April* are uſually ſowned Marjerome, Basil, Coleflowers; for by often transplanting and care, you may have Coleflowers from ſeed,

24 *Seasons of sowing several Seeds.*

sowed in the Spring, though it be very far gone, even to *June* or *July* the same year, *Pincks*, *Armeriaes*, *Convolvulus*, *Kidney-beans*, *Lupins*, *Hyssope*, *Lavender*, *Stock-gillyflowers*, *Thyme*, *Hemp*.

About the latter end of *April*, *Purflane*, *Clove-gilliflowers*, *Carnations*, *Basil*, *Rosemary*, *Oke of Paris*.

About *Midsummer* sow the early *Pease*, to be ripe six weeks after *Michaelmas*.

Note that our *Gardiners*, though there be some peril, chuse to sow early, because they have much advantage by all sorts of forward commodities; so *Turnips* being sowed early, many of them run to seed, yet one good then, is worth three at another season. The same may be said of *Pease* and *Carrets*, which by cold are spoyled many times; yet it is observed by some, that oftentimes, whether by difference of ground, or other accident, the *Bean* latter sowed will overtake the former, and so in some sort of *Pease*.

About the middle of *July*, when the *Mesereons* berries are first ripe, they are to be sowed, they come not up until the second Spring after their being sowed, and a year or two after are removed, all which time they require no other attendance besides weeding.

Many seeds are best sown about *August*, so *Turnips*, and the *black Radish*, for a peculiar reason; which is, being sown sooner, they are apt to run up to seed before *Winter*, and not

not to fill the root at all. Onions for Winter provision, Lettice and Corn-sallet for the same occasion; Spinage too, always upon that account, though otherwise they may be sowed with the first. Nay, our Gardiners here in *Oxford* sow Turnips in *April*, and so forward till the Winter.

Cabbage plants are sowed commonly about *August*; and the first Coleflowers, that they may before Winter be so grown, as to be transplanted at greater distance, so to abide till the Spring. I have known some, when frost has spoyl'd the winter Cabbage-plants, to have furnished themselves from plants raised in the Spring upon a hot bed.

Many seeds must be gathered a little before they are thoroughly ripe with the stalkes on which they grow; for should it abide until the full maturity in the Garden, by wind and weather great part of the seed would be shed, which will easily perfect its ripeness as it lyes cut upon its stalk, being laid any where within doors upon a cloath or mat where the Sun comes. Of this kind is Lettice, and most of those seeds that arise from the stock with a wooliness.

There are many Plants that will grow in all times of sowing, and therefore are sown many months, one after another; so Radishes, and Spinach, and Pease, which are sown with the first in the Spring; and so month after month till Autumn. Those Lettices which abide

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abide the Winter, are wont to be transplanted to Cabbage in the Spring, even as Cabbage are with admirable success.

Our Gardiners, that they may have Cucumbers to sell one under another, plant them in hot beds from February even till May.

Pease are sown from the beginning of November (or by some a fortnight before, though with some danger of the biting frost) and so forward till after *Shrovetide*.

The General Use for sowing of the early Pease, is to chuse a light warm ground, and to sow the first about the beginning of November, where their fields are large, Gardiners generally Plow their ground, and then harrow it well, and after that, draw pretty deep furrows with their howes, and cover their Pease therein. The sooner they sow their Pease, the deeper they make their furrows to preserve the root from the cold; as soon as these Pease are gathered, they Plow the ground again, and sow it with Turneps, for which, by the Pease, the ground is well prepared, and for the sowing of which, that season of the year doth best agree.

Rounsevals, if sowed never so early, will scarce come before the latter part of the Month of June.

Husbandmen generally use to sow Wheat under furrow in the Autumne; but I have seen it in rich and warm ground with good success sown in the Spring, and harrowed

in after the manner of sowing Barley; the crop being as good as any other times upon the same ground, after the usual country procedure.

Some seeds must be sown dry, not after rain or watering: Of this kind is Myrrhis seed, Basil, Scorzonera, and all such as being wet run to a Muscilage.

Many times they sow divers seeds in a Bed together, as Radishes and Carrots, that by such time as the Carrots come up, the Radishes may be gone. Upon beds newly set with Licorice, they sow Onions or Radish, or Lettice if their Licorice plants or ground be but weak, so as not quickly to cause a shadow with their leaves. London Gardiners sow Radish, Lettice, Parsley, Carrots, on the same bed, gathering each in their seasons, and leaving the Parsnips till the Winter; before which time they are not esteemed good, or wholesome.

Question. Concerning the mixing of several kinds of Seed; and sowing them in the same bed?

I confess it may be a question whether there is not in some cases more caution to be used, and in others more improvement to be made then is vulgarly imagined in the setting Plants of different Natures in greater propinquity or Distance. For it is an Observation of the learned *Gassendus*, that not onely ho-  
her's

herbs are made more cold, or brought nearer to a temperament, by being sow'd or planted in a cold soyle, and cold herbs made more hot by being placed in a hot soyle, but also that cold herbs being sow'd near hot ones, become more temperate: For example, that the coldness of Lettuce is corrected by being sow'd among Onions. *Lib. de Plantis cap. 3. & Facultatibus Plantar. and afterward in the same Chapter, That if you set white Hellebore, or the herb Mercury near a Vine, the Grapes will acquire a purging Faculty.* And it is an Observation of *Dodoneus lib. 5. of his History of Plants, cap. 37.* where he describeth his *Raphanus Montanus*, or great Mountain Radish, That it hath been found by experience, that this Plant doth hinder the growing of the Vine, and being Planted near it, doth cause the Vine to starve, or wither away, which property some of the antient writers ascribe to Cole-worts. *Pliny l. 17. 24.* asserts the same concerning Vines. His words are, *Quarundam plantarum Odor ludit Vites, sicut Raphanus & Laurus. Olfatrix enim intelligitur Vitis. & tangi Odore mirum in modum. Ideoque cum fuxta sit averti & recedere, saporem inimicum fugere, Odit & caulem & olus omne, Odit & Corylum ni procul absint, trifolia & egra.* And this agrees with *Virgils Georgicks.*

*Neve inter vites Corylum sere----*  
*Nor plant rough Hazels 'mongst the tender Vines.*

Note,

Note, that where your grounds are very warm by reason of hedges, hot beds, dunghills, &c. that may abate the power of the frost, seeds may be ventured into the ground much sooner than otherwise in ordinary places.

Cabbage seeds and Coleflowers are sowed in *August*, or so timely as to be exactly well rooted Plants before winter; and this is the best way: Or are sowed after, so that they are transplanted in the time of cold. This way is hazardous in the winter, by reason of the nipping Frosts, and chargeable, in that they require much attendance, and covering, and uncovering, which those Plants that are confirmed before winter do not. Secondly, they are more subject to Caterpillars in the Summer; but the way of raising of them by hot beds in the Spring for Cabbages is the worst way of all, and most subject to the peril of that vermine.

Those Plants of the Spring sowing, that you sow later than ordinary, require to be the more watered & shadowed from the heat.

Those in the Spring that are sowed earlier than ordinary, require the more to be defended from the cold.

Those in the Autumne, that you prematurely sow, are to be watered and shadowed the more. Those which you sow late are to be better defended from the Winter till they have gotten strength.

Num. 4. Examples of Sowing with some particular directions for some choice Vegetable,

Examp. 1. From Mr. Parkinson and Mr. Ray, directing skillfully the ordering of Tulips in their propagation by seed.

*Sowing of Tulips.* The first example I shall give you out of Mr. Parkinson: The time (say he) and manner of Sowing Tulip-seed is thus: you may not sow them in the Spring of the year, if you hope to have any good of them, than but in the Autumne, or presently after they be through ripe and dry; yet if you sow them not until the end of Octob. they will come forward never the worse, but rather the better; for it is often seen, that over-early sowing causeth them to spring out of the ground over-early, so that if a sharp spring chance to follow, it may go near to spoyl all, or most of the seed: We usually sow the same years seed, yet if you chance to keep of your own, or have of others, such seed as is two years old, they will thrive and do well enough; Especially if they were ripe and well gathered: you must not sow them too thick, for so doing hath lost many a Peck of seed; for if the seed lie one upon another, that it hath no room upon the sprouting, to enter or take root in the earth, it perisheth by and by; Some use to tread down the ground where they

they mean to sow their seed, and having sown them thereon, do cover them over the thickness of a mans Thumb, with fine sifted earth, and they think they do well, and have good reason for it: For considering the nature of young Tulip-roots is to run down deeper into the ground, every year more than other, they think to hinder their quick descent by the fastness of the ground, that so they may increase the better. This way may please some, but I do not use it, nor can find the reason sufficient; for they do not consider that the stiffness of the earth doth cause the roots of the young Tulips to be long before they grow great, in that the stiff ground doth more hinder the well thriving of the Roots than a loose doth: and although the roots do run down deeper in a loose earth, yet they may easily by transplanting be holpen, and rais'd up high enough. I have also seen some Tulips not once removed from their sowing to their flowering; but if you will not loose them, you must take them up while their leaf or stalk be fresh, and not withered: for if you do not follow the stalk down to the root, be it never so deep, you will leave them behind you.

The ground also must be respected, for the finer, softer, and richer the mould is, wherein you sow the seed, the greater shall be your increase and variety. Sift it therefore from stones and rubbish, and let it be either natural

tural ground of it self, or being muckt, let be thoroughly rotten: some I know to mend their ground, do make such a mixture of grounds, that they mar it in the making.

**Ferrarium** bids that the seed be sown in *September*, (as soon as rain shall make the ground fit) half a fingers breadth in good Garden-mould, not to be removed in two years after, at which time they are to be removed and placed in several beds, according to their several bigness, where in 4 or 5 years they will bear their flowers.

After the Tulip-seed is sown, *Mr. Parkinson* (faith *Mr. Parkinson*) the first *way of ordering the seedlings of Tulips.* years bringing, bringeth leaves little bigger then the ordinary grass leaves; The second year bigger, and so by degrees, every year bigger then other. The leaves of the *præcoces*, while they be young, may be discerned from the *Media's*, by this note which I have observed, The leaves of them do stand above ground, shewing the small foot-stalkes whereby every leaf doth stand; but the leaves of the *Media's* or *Serotines* do never wholly appear out of the ground, but the lower part which is broad, abideth under the upper face of the Earth.

Those Tulips now growing to be three years old (yet some at the second year, if the ground and air be correspondent) are to be taken up out of the ground (wherein you shall

shall find they have run deep) and be new planted after they have been a little dry'd and cleansed either in the same or another ground, again placing them reasonable near one to another, according to their greatness, which being planted and covered over with earth again, of about an inch or two thickness, may be left untaken up again two years longer, if you will, or else removed every year after, as you please, and thus by transplanting them in their due season (which is still at the end of *July*, or at the beginning of *August*, or thereabouts) you shall according to the seed and soyle, have some come to bearing in the fift year after their flowering, some have had them in the fourth: (but that hath been but few, and none of the best, or in a rich ground) some in the sixth and seventh, and some per-adventure not until the eighth or tenth year. But remember that as the roots grow greater, that in the planting you give them the more room to be distant one from another, or else the one will hinder (if not rot) the other.

The seed of the Precoces do not thrive and come forward so fast as the Media's or Sero-tines, nor do give any off-sets in their running down, as the Media's do, which usually leave a small Root at the head of the other that is run down every year; and besides are more tender, and require more care and attendance then Media's, and therefore they are the more respected.

This is a general Rule in all Tulips, that all the while they bear but one leaf, they will not bear flower, whether they be seedlings, or the off-sets of elder Roots, or the Roots themselves, that have heretofore born flowers; but when they bear a second leaf, breaking out of the first, it is a certain sign that it will then bear a flower, unless some casualty hinder it; as Frost or Raine, to spoile or murther the bud, or other untimely accident befall it.

To set or plant the best and bearing Tulips somewhat deeper then other Roots, I hold it the best way. For if the ground be either cold or lyē too openly in the cold Northern aire they will be the better defended therein, and not suffer the frost or cold to peirce them so soon, for the deep frosts and snows do pind the Precoces chiefly, if they be too near the uppermost crust of the Earth, and therefore many with good success cover over their ground before Winter, with either fresh or old rotten dung, and that will marvellously preserve them. The like course you may hold with seedlings, to cause them to come on the forwarder, so that it be after the first years sowing, and not till then.

To remove Tulips after they have shoforth their Fibres or small springs which grow under the greater round Roots (that is from September until they be in flower) is very dangerous, for by removing them when they have taken fast hold in the ground, you do hinder

hinder them in the bearing out their flower, and besides put them in hazard to perish, at least to be put back from bearing a while after as often I have proved by experience, but when they are now risen to flower, and so for any time after, you may safely take them up if you will, and remove them without danger, if you have any good regard to them, unless it be a young bearing Root, which you shall in so doing much hinder, because it is yet tender by reason it beareth now the first flower, but all Tulip Roots, when their stalk and leaves are dry, may most safely then be taken out of the ground, and be so kept (so that they lie in a dry, and not in a moist place) for six months without any great harm, yea I have known them that have had them nine months out of the ground, and have done reasonable well, but this you must understand withal, that they have not been young, but elder Roots, and have been orderly taken up and preserved; the dryer you keep a Tulip root, the better, so as you let it not lie in the Sun or the Wind, which will pierce and spoile it.

Commonly (faith Mr. *Rea*) we make choice of such as we intend for seed, when they are in flower, but in so doing, we often fail of our purpose, for that the roots loose their fibres, and the stalks dry before the seeds come to be half ripe; to prevent which, make choice of the strongest roots you have,

of such flowers you desire to seed, and set them in that part of your garden most exposed to the sun six or seven inches in the ground ; by which means you may gain good ripe seeds from almost any flower, as I have found by experience.

About the middle of *July*, sooner or later as the Summer is hotter, the seeds will be ready to gather, which may be known by the dryness of the stalks, and the opening of the seed vessels : which gather, and take up the roots, letting the seeds remain in the pods till the end of *September*, and then take them out, which being cleansed from chaff, may be sowed in beds of fine sifted earth, especially the more ordinary sorts ; but those of the choicest flowers must be sowed in boxes filled with the finest earth that can be gotten in respect the young roots are apt to run down deep in the earth, so that in beds many of them will be lost : sow not these seeds too thick, nor cover them more then a finger thick ; in *March* following they will come up with small leaves like grass, and in *April* weed and gently water them, as often as you shall find occasion. About Midsummer, two years after the sowing, you may take them up, cleanse the small roots, and set them again in rows at a wider distance, and so every other year until they come to bear flowers, still altering the earth with fresh earth, and sifted Compost before you set them again ; It will

be six or seven years before the *Præcoces* will bear flowers, but the *Medias* a year or two sooner; when you see the flowers, mark out the best, and give them new names, casting away the common Reds, Yellows, and Purples, and reserving such self-colours chiefly as are light with blew purple, and black bottomes and *Tamis*, for such often change into fairer flowers, and better marked then many that shew their best at first flowing.

*Example 2, Of Anemone's.*

Within a month after the seed of *Sowing of Anemone's* is gathered and prepared (*Anemone's*. in *August*, says *Ferrarius*, or three days before the full Moon in *Septemb.*) it must be sown, for by that means you shall gain a year in the growing, over that you shall do if you sowed it the next spring: If there remain any woolliness in the seed, pull it a sunder as well as you can, and then sow your seed reasonably thin upon a plain smooth bed of fine earth, or rather in pots or tubs, and after the sowing, sift or gently strew over them some fine good fresh mould, about one fingers thickness at the most for the first time; and about a month after their springing up, sift, or strew over them in like manner (this is a necessary circumstance) another fingers thickness of fine earth, and in the mean time, if the weather prove dry, you must water them gently and

often, and thus doing, you shall have them spring up before Winter, and grow pretty strong, able to abide the sharp Winter in their Non-age, in using some little care to cover them loosely with Fearn, Furz, or Bean-straw, or any such things, which must neither lie close to, nor too far from them.

The next Spring after the sowing, or which is better the next *August* you may remove them, and set them in order by Rowes, with sufficient distance one from another, where they may abide, until you see what manner of flower they will bear.

Many of them being thus ordered, if your mould be fine, loose and fresh, not stony, clayish, or from a midden, will bear flowers the second year after the sowing, and most or all of them the third year, if your ground be free from smoaks and other annoyances. Nay *Mr. Austen of Wadham Coll.* a skillful Florist, assured me that he has had *Anemones* from the seed sowed in Summer, that were in flower within ten months of the time of their sowing.

*Num. 3. Example the 3d of Auricula's which is applicable to the choicest Primroses & Cowslips.*

Our great Florist, *Mr. Rea*, being very particular in his Rules concerning the raising of *Auricula's*, I shall add from him a third example. After (saith he) the flowers are past, and

and the stalks begin to grow yellow, you may observe in the top of that little round seed vessel a small hole, and then you may be assured the seed is almost ripe, and if you do not carefully look to it, will be all thred before you are aware; therefore as soon as you perceive it to be ready, cut down the stalks, keeping the Tops upright, for if you turn them downwards, all the best seeds will fall out; then bind them into bundles, and place them upright to the glass of some *South* window, where (by some benefit they will receive by the Sun) they will harden, and be much the better; Towards the end of *August*, or beginning of *September*, prepare some square box or boxes according to your store of seeds, that are nine or ten inches deep, and of what breadth you please, with some holes in the bottom to let out water; which fill three parts full of fine sandy sifted Earth, one half thereof being well rotted Neates dung, which mingled well together, and laid smooth with a Trowel, lay thereon a fingers thickness of fine sifted Willow earth, or for want thereof dried Cow-dung beaten small, mingled with a little good Earth, and sifted, sow your seeds thereon mingled with Wood-ashes, which by their colour will direct you to sow them the more suitably; they must not be sowed too thin, for all will not come up, if they do they may easily be removed to another place; after the seeds are thus sowed,

cover them half a finger thick with the same you put next under them, which press down lightly, and let them remain in the Sun and Air until they begin to come up, which will be about *April*, and then they must be removed into the shade, and often gently watered; as soon as they are brought to any considerable bigness, take some of them up, where they are too thick, and set them presently in some bed prepared for that purpose, six or eight inches asunder, where they may remain until they come to bear flowers; Those you leave in the box may be transplanted in the end of *August* after the same manner, and so the box will be ready again to sow more seeds; some of them will bear the Spring following, others about *August*, the year after they are sowed, and the rest the Spring then next following, provided the ground you set them in be rich and good, otherwise you will loose all the delight of your labours. Some are of Opinion, that the beginning of *October*, others the end of *February*, is the best time to sow them, but having tryed all those times, I find that before mentioned to be the best; For the seeds are so small, that if they be kept any time out of the ground they will be all dead. Now above all things, you must be sure to get the seeds of good flowers, for from thence springeth all your hope, when you see their flowers, those you dislike cast away, and keep the rest for your use.

Num. 4. *Clovergrass being esteemed as great an improvement as any our ground is capable of: I shall add such special directions as are given for the ordering thereof: Sir Richard Westons observations and rules are as followeth.*

Clover-grass-seed thrives the best when you sow it in the worst and barrenest ground. Such as our worst heath ground in *England*. The ground is thus prepar'd for seed.

First pare of the heath; then make the paring into little hills: you may put to one hill as much paring as comes off from a Rod or Pole of ground, which is the square of sixteen feet and a half. The hills being sufficiently made and prepared (as they do in Devonshiring as they call it) are to be fired and burnt into ashes. And unto the ashes of every hill you must put a peck of unslaked Lime; the Lime is to be covered over with the ashes, and so to stand till Rain comes and flakes the Lime. After that mingle your ashes and Lime together, and so spread it over your Land. This done, either against, or shortly after Rain, Plow and Sow; ploughing not above four inches deep, and not in furrows, but as plain as you can, and to make it yet plainer, Harrow afterwards, and that with Bushes under your Harrows.

The ground being thus prepared, you may sow

sow your seeds. An Acre of ground will take about ten pounds of Clover-grafts-seed, which is in measure somewhat more than half a Peck. The chief season for sowing it is *April*, or the latter end of *March*.

About the fift of *June* it will be ready to be cut. It yields excellent hay. The time of cutting it will be more exactly known, by observing when it begins to knot; for that is the time: And ere the year be done, it will yeild you three of those crops, all of them very good hay; and after you have thus cut it the third time, you may then feed the ground with Cattle all the Winter, as you do other ground.

But if you intend to preserve seed, then must you expect but two Crops that year, and you must cut the first according to the foresaid directions, but the second growth must be let stand, till the seed of it be come to a full and dead ripeness, and then must you cut it, and thresh the tops, and so preserve the seed, you shall have at least five bushells of seed from every Acre.

This seed thus threshed off, there will be left long stalks, these your Cattle will eat; but when they grow old and hard, you are to boile those stalks and make a mash of them, and it will be very nourishing either for Hogs, or any thing that eat thereof.

After the second cutting for seed, you must cut that year no more; but as it springs again,

gain, feed it with Cattle. One Acre of it will feed you as many Cowes as six ordinary Acres, and you will find your Milk much richer; which induces some not to cut it at all, but only to graze it for their Dayry.

Being once sowed, it will last five years, and then being plowed, it will yeild three or four years together rich crops of Wheat, and after that a crop of Oats.

And as the Oats begin to come up, then sow it with Clover-seed (which is in it self excellent Manure) for you need not bestow any new dressing upon the ground, and by that time you have cut your Oates, you will find a delicate grass grow up underneath, upon which, if you please, you may graze with Cattle or Horse all that year, and the next year take your Crop as before at pleasure.

To prevent mistake, I must give this advertisement, that whereas Sir *Richard Weston* commends Heathy ground, he is not to be understood, of such dry and barren ground without its best Manure by chalk, lime, and the like artifices of Husbandry. For otherwise it has failed in the growth and improvement thereby expected. Mr. *Elith* commends ground naturally good, betwixt tenne and twenty shillings an Acre: giving this general Rule, that no land can be too good for Clover that is not too good for Corn.

Hemp and Flax are used to have the same culture, and the best Husbandry

*Hemp.*  
*Flax.*  
that

that I have observed of them has been in *Staffordshire*, where this procedure is generally observed. About the beginning or middle of April, the Flax-seed is sown upon new broken ground, immediately upon it's being broken up. The seed they either have from their own Crop, or buy it from a warmer Country: Mr. *Blith* reports the true East-Country seed to be far the best, who for tryal of both, sowed on the same land, the Ridge or Middle with our Country-seed, and both the furrows, with Dutch or East-country seed, (such as is bought in the Seedmens shops at *Billingsgate* in *London*) the effect was that our seed, though on the ridge it had the advantage of the ground, was encompassed with the Dutch, as with a wall about it, so much the Eastern-seed did out grow it. He likewise for warmer parts, as *Essex* and *Kent* thinks *mid-March* a convenient season for sowing it: If weeds grow therein, they carefully weed their Crop, and pull it in dry weather, when it looks yellow, (lest growing over ripe, it blacken and mildew) and tye it up in handfulls, that it may perfectly dry. Then they riple it, that is, they get out the seeds by drawing it through an Engine like an Iron double tooth'd Comb, which they call a Ripple: the boles of seed pulled off, they lay on a boarded or plaster'd floor to dry, it being dried, they lay it up, and thresh it not out of the boles till *March*, when they winnow it clean from the husks.

The

The watering of it is thus ; The Flax being well dried, they bind up about 20 handfulls in a bundle, and putting many of these bundles together, they stake them down in the water, that they may not be carried away by the Stream. The Flax abides in water 4 or 5 dayes and nightes, then they spread it on the grafs that it may be dry, turning it every three days, and when it is full dried, then lay it up and house it, and when they see their occasion they use their Brake and Crack, instruments devised for the purpose to bring the Tow from the Flax. The whole Government and Husbandry of Hemp, from the Seed to the Distaff, is so like this of Flax, that the same example and rule may very well serve for both.

Tobacco is a Native plant in the *Tobacco*. hot parts of *America*, and there prospers best in shadowy places. For the extreme heat of the Sun would cause the leaves to fade. But in these Countries the hottest situation is most proper for it ; and it is best ordered thus. Gather your Seed from the bottom of the Plant, and sow it as early as you can after Christmas on a hot bed, (not in *September* as *Everard* and *Magnenus* direct) and so produce your Plants until they be as big as Cole-flower-Plants.

In your transplantation of them, chuse the richest soile that can be made, none can be too rich if the Dung be perfectly rotten, and incorpo-

## 46 Sowing and Planting Tobacco and Woad.

incorporated with the Earth, then set the ~~button~~ steri  
even with the ground, but bury it not. See  
the Plants about half a yard distance, and top  
them at the third leaf to thicken those that  
grow below, thus taking off the button be-  
fore it flowers at the third leaf from the top  
unless you intend your stalk for seed.

Let the place into which they are trans-  
planted, be under a South-wall, or otherwise  
with hedges, or fences of Reed, be defended  
from sharp weather.

When you gather your Plants for Use, ty-  
two Plants together, and hang them in a  
shadowy place upon lines, but place them not  
too thick upon the lines, least they fruck, as  
the Planters call it, that is, grow mouldy  
upon the lines.

Woad, according to Mr. Bliths directions,  
**Woad.** is best sowed where you sow Barly or

Oates, upon that very husbandry or  
tilth, about the middle of *March*, and may  
grow up among the Corn, because it groweth  
not fast the first Summer, but after the Corn  
is cut, it must be preserved; it requires a rich  
and warm soil. This Plant is of great use to  
Dyers, and coloureth the bright yellow, or  
lemon colour; It abates the strength and su-  
perrichness of land, and may prepare for  
Corn in land of its own Nature too rich,  
which is sometimes a fault, though not so fre-  
quently as the contrary extream.

Beans require a low deep ground and wa-  
terish,

waterish, not dry, sandy or gravelly soyle: This is true of field or horse Beans, though I first took notice of the great difference in our London Gardens, where the Labourers, for their own eating, would give one part in three more for a measure of Beans from the former, than from the latter soyl, who assured me that from the same seed and care, garden beans have much more meal, pulpe, or kernel, and thinner skins in the moist, than in the dryer and less waterish ground.

Num. 4. *The General observation for the manner of sowing.*

Besides the Examples aforesaid, I shall add some Rules, such as by Gardiners are usually observed.

This is general, that all seeds must be covered with the Earth, which is done, either by sowing the ground, and turning the seed in under the furrow, or by drawing trenches in the soil, and then drawing the Earth over them with a hoe, or sowing the beds ready drest, and hacking in the seed with the same instrument, or by harrowing, raking with a rake, or drawing bushes over the sowed ground to cover the seed, or to set the single seeds with a stick, or lastly, to sow the ground and afterwards to sift or strew fine mould thereon.

The two last wayes are for choice seed, when

when the workman desires to loose none for want of burying : The sowing under furrow is for such seeds as must endure the winter, the depth of ground being part of their security against the winter colds : nor are all seeds of strength to shoot their germe through so much earth. The sowing in trenches is used for Pease, there being thereby spaces left between the rowes, of half a yard more or less, to gather them as they ripe, and room whence to draw mould to the roots, which frequently done, is very advantageous to them. It is likewise handsome for Spinach, Endive, Thyme, Savory, or other garden herbs, to grow in rows after this manner of sowing.

Moisture is absolutely necessary for the growth of all Plants, two or three dayes after a great rain is accounted a good season ; in dry weather two days after rain, say the London Gardiners, agreeable to that of *Ferrarius*. *Nec tamen simulac magnis imbribus terra permaduit, seres, sed tantisper expellabis, dum pluvius illudor modice exsiccat, ne madenti limo soque in solo statute radices exputrescant*, de Fl. cult. l. 3. c. 1. Seeds that are apt to run to a Muscilage, are unfit to endure moisture upon that account, as else where I noted.

I prescribe nothing concerning the observation of the faces of the Moon ; For though the Moon hath greater influence upon all terrestrial bodies, then any other Planet, except

the

the Sun, yet I cannot think that it is much Material under what Phasis of the Moon the Gardiner either Sows or Plants. Neither do Gardiners that work, nor Authors that write, prescribe alike rules; but contradict each other in their directions, for the particular observation of this Planet, as to any intended production. Nor is it agreeable to my reason, that the Moons being in the full at the first explication of the two dissimilar leaves, or germination of the Plant, should cause a double flower: This germination, according to this present History, differing little from other augmentations of the same Plant, in opposite quarters immediately ensuing: so that if a full Moon be proper, I see no reason why it may not be effectual, by vertue of the same phasis, the third, as the first, or the twelfth, as the sixth day of the seedlings augmentation.

The meliorating of ground belongs to the head of Improvement; here I shall only observe that where ground is very light, as in some *London* and *Kentish* Gardens, it is found profitable after sowing, to tread in the seed.

Some steep all Garden seed before they sow them to make the germination more speedy, but seeing there be no better wayes of infusion than in Earth and Water, why the same bosome of a well watered ground should not be most fit for this operation I see not.

## 50 Plants that bring Seeds yeilding Variety.

In seeds that are long in coming up, the seed bed is not to be digged up the first winter: For I know divers seeds that will for a great part of them lye under ground the first year, and come up the second: of this Nature is the Ash-key sometimes, the Peach, Malcotone and some Plums.

*Num. 5. Of variety of kinds, different in colour, taste, smell, and other sensible qualities, proceeding from some seeds, and what Plants they are that bring seeds yeilding such variety.*

In the knowledge of what is proper to be taught, under this head lyeth one of the chief Mysteries of the Gardiner, and in the practise of it lyeth his chief gain. And therefore least I should be thought worthy to suffer for revealing of their secrets, I shall in my own defence, while I open their Art in matters of greatest moment, cite the Publishers too. I will begin with Carnations. In them you have seeds that give admirable Variety from the Orange-tawny Carnation, and all his stript kinds that are double, and keep their tawny in them in any measure. The white, Tawny, and Carnations darkly spotted, *Ferrarius* commends for producing variety of colours and stripes. Kernels of divers Apples and Pears, bring variety of kinds, different in taste, smell, colour, and hardnes, and are as often promoted to better, as they degenerate to worst, as I am

I am very credibly informed, by persons that profess themselves to have seen the experience. The kernels of the Bergamot Pear have brought a notable alteration, and produced a Pear far beyond that excellent kind: Peaches and Malecotones do ordinarily the like, so that by seed is thought to be their best propagation.

Our Gardiners in choosing the seed of stock-Gillyflowers, to make them bring double stocks, take their seed from such tops as bring five leaves in their flower, especially if there be one strip't; but Mr. P. sayes, those that bear double seeds, cannot be distinguished from the other, and I have reason to believe him, for such as chuse their seed this way do not find that it answers their expectation.

For Tulips that are early, or *Præcoce*s, the purple (sayes Mr. *Parkinson*) I have found to be the best, next thereto is the Purple with white edges, and so likewise the red, with yellow edges; but each of them will bring most of their own colours. For the *Media*'s take those colours that are light, rather white then yellow, and purple then red. Yea white, not yellow, purple, not red: but these again to be spotted is the best, and the more the better: But withal, or above all, in these respect the bottome of the flower, (which in the *precox* *Tulipa* you cannot, because you shall find no other ground in them but yellow) for if the flower be white or whitish, spotted,

52 *Variety of Plants from what Seeds.*

spotted, or edged and straked, and the bottome blew or purple, (which is found in the Holias, and in the Cloath of Silver) this is beyond all other the most excellent, and out of question the choicest of an hundred, to beget the greatest and most pleasant variety, and rarity, and so in degree the meaner in beauty you sow, the lesser shall your pleasure in varieties be: Bestow not your time in sowing red or yellow Tulipa-seed, or the divers mixtures of them, they will (as I have found by experience) seldome be worth your pains. The Serotina being not beautiful, brings forth no special variety: *Ferrarius lib. 3. cap. 7.* commends the Serotina for seed, (but I find he mentions but two sorts in that Chapter, *Præcoces* and *Serotine's*) and among them the white, with the black purple, or blew bottomes or Scarlet, with sky-coloured bottome inclining to purple; for both of them will (sayes he) bring Tulips mark't with variety and handsomness: But Tulips without a blackish bottome are no good breeders of various coloured flowers.

Variety in Tulips (saith Mr. *Rea*) is affected chiefly by sowing the seeds of some choice flowers, as also by the changing of Off-sets, and the secret working of Nature upon divers self-colours.

For seeds you must be sure to make choice of such flowers as have strong stalks, and the seed vessel three square of such kinds as are most

most constantly well marked, and such as have the bottomes and Tamis either blew or purple, which is rarely to be found in the *Præcoces*, whose bottomes are commonly white or yellow; yet there is one excellent kind that goeth by the name of the *Omen*, that aptly marketh with 3 colours, and hath the bottom and *Tamis* both blew, from the seeds whereof, doubtless many fine varieties may be raised; Next unto this the *Florizante*, *Morillion*, *Cramofine*, *Perishot*, *Admiral Encusens*, and the rest of the well marked *Præcoces* are not without hope, but from the Vice-Roy, and the varieties of Edgers few better then the Originals are to be expected.

The Media's or middle-flowring Tulips afford many more excellent varieties fit for this purpose, as the *Adoratea* of Holland, *Carthago*, *Paragon*, *Jeron*, *Doctor Bolson*, *Paragon Florison*, *Royal Tudart*, *Orient Virgin*, *Diana*, *Angelica*, *Cedanella*, *Princess Turgiana*, all the *Brabasons*, blew *Anvers*, and divers others; All these named, being well marked flowers of different colours, with blew or purple bottoms and Tamis, not apt to run, but abiding constant to the last; and therefore all flowers of hope, and such as few Lovers and Collectors of Flowers are without.

And although probably many fine flowers may be raised from the seeds of those well-marked flowers before mentioned; yet such

54 *Variety of Plants from what Seeds.*

as have a good collection of Modes, or self-colours, observing what colours are aptest to change, and by the bottoms running up into the leaves, become well marked with several colours, doubtless by sowing the seeds of such, the product may be answerable to expectation; and though they come at first wholly of one colour, yet if that be either Orenge, Brimston, Hair, Dove, Gredeline, Isabella, Shamway, or any other light or strange colour, they are to be esteemed, for in a year or two, many such have changed into good marked flowers, and so with all their increase continued.

To hasten which effect, let such of your colours as are strong and luxuriant, be set in lean and hungry, but fresh ground, and the next year after in that which is fat, and well manured; and so yearly removed to contrary soiles, until you obtain the end desired; and such flowers may be set in your Garden, and the rest continued. The like course is held with off-ssets, to cause them to alter from the Original, as many have done, for the General Bole came from the Brown Anvers, the Cedrella from the Zeablom, and many fine flowers from the Brabason, Turloon and Widows.

The two lesser Spanish bastard Daffodills, the leaves of which are of a whitish green colour, one a little broader then the other, and the flowers pure white, bending down their heads, that they almost touch the stalk again,

again, give seed from which springs much variety, few or none keeping either colour or height with their mother Plant.

The seeds of divers *Sowbreads*, by name the *Roman Sowbreads with round leaves*, the *Autumnal Ivy leaved Sowbread*, some *flowers-de-lis*, and many sorts of *Bears-ears*, and *Armenia's* also, and *Stock-gilliflowers*, do the like in producing admirable variety.

As for Anemones, take it from Mr. P. and our common daily experience, that there is not so great variety of double Flowers raised from the seeds of thin leav'd Anemones, as from the broad leaved ones. Of the *Latifolias*, the double Orange-tawny seed being sown, yeildeth pretty varieties, but the purples, or reds, or crimsons, yeild small varieties, but such as draw nearest to their original, although some be a little deeper or lighter then others: But the light colour are they that are chief for choice, as white, ash-colour, blush, or Carnation, light Orange, Simple, or party-coloured, single (or double if they bear seed) which must be carefully gathered, and that not before it be fully ripe, which you shall know by the head, for when the seed with the woolliness beginneth a little to rise of it self at the lower end, then must it be quickly gathered, lest the wind carry it all away, after it is thus carefully gather'd, it must be laid to dry for a week or more, which then being gently rubbed with a little dry sand,

sand, or earth will cause the seed to be better separated, though not thoroughly, from the woolliness or down that compasseth it.

In the seed of the Mervail-of-the-world, take notice, that if you would have variable Flowers, you must chuse out such Flowers as be variable while they blow, that you may have their seed ! for in this Plant if the Flower be of a single colour, the seed will likely bring the same.

*Num. 6. Some other relations of Transmutation, and the possibility of a change of one species into another examined.*

I have often heard persons affirm, that they have sowed Barley, or some other grain, and in the ground the seed hath been so altered, as to send forth Oates instead of Corn, according to its own species. I am as yet far from giving any assent to this their History. The reasons why I disbelieve them are, first, because the Relators affirm whole fields to be thus varied, and that to another species, viz. Oates, which is different from Barly in the straw, ear and grain it self. Whereas in the variation of seed, in those vegetables, in which the change is undoubted, the colour only of some other easily alterable accidents (such as the sensible qualities are generally found) are transmuted: And this transmutation ends not at all in another divers kind;

but

but in several small diversities of the same kind. The stories of Wheat turned to Mustard-seed were as likely to be true, and is a fit parallel to create a right belief of the true cause of the mentioned effect. Secondly, I knew a Gentleman who plowed a piece of land in the Spring, and then sowed it not, but after it was harrowed, and prepared for seed, left it to its own Genius and Nature to produce what it was inclined to: The Ground was of its own Nature apt to bring forth wild-Oates amidst the Corn, now in defect of Corn there grew as many wild-Oates unmixt from any other weeds, as the land could carry. This was tried in a great peice of land, and much profit was made of the Oates, the Gentleman having cut them green for Fodder,  
*Anno 1657.*

My opinion therefore is, That the fallacy which beset my abovenamed Relators was, that they mistook the cause of the production of the Oates mentioned; for to me it is much more easie to conceive, that by some evil accident, as it often happens (the Seed-corn being corrupted and perish'd in the ground) the ground its self from its own Seminary, sent out the supposititious Crop of Oates or Mustard, than that there should be a variety of so strange a Nature, and declension from its property, in the issue of any species.

*A Digres-*

*A Digression concerning the possibility of the Transmutation of Species.*

It is indeed grown to be a great question, whether the Transmutation of a species be possible either in the Vegetable, Animal, or Mineral kingdom. For the possibility of it in the Vegetable: I have heard Mr. Bobart and his Son often report it, and proffer to make Oath that the *Crocus* and *Gladiolus*, as likewile the *Leucoion*, and *Hyacinths* by a long standing without replanting have in his garden changed from one kind to the other, *viz.* the Saffron-flowers into the Gladioli: and for satisfaction about the curiosity in the presence of Mr. Boyle, I took up some bulbs of the very numerical roots whereof the relation was made, though the alteration was perfected before, where we saw the divers bulbs growing as it were on the same stool, close together, but no bulb half of the one kind, and the other half of the other: But the change time being past, it was reason we should believe the report of good artists in matters of their own faculty.

Mr. Wrench, a skilfull, and industrious gardiner for fruit, and kitching-plants, told me, that the last year there was a change betwixt the kinds of the Cole-flower, and the Cabbage. Others I know, who as from their experience, most confidently affirm, that they have

have Prime-roses of the milk white colour, the root whereof before in another ground bare Oxelips. In the kind of purple Primroses I have taken up roots whereof the one half hath at the same time born one or more Oxelips, and divers Primroses together with them. The Primerose was the smallest sort of the purple colour; the difference of the Flowers this, that the Oxelip came up with an exceeding full stalk, and many small flowers thereon, the part of the root that bare Primeroses, sent out many small stalks very much inferiour to that of the Oxelip, with Flowers like those born by the Oxelip. The first that I saw of this kind, were in that excellent Chirurgeon Mr. Day's garden, where I was informed that they were deriv'd originally from pure simple Primeroses, but since I have observ'd them in divers other places. But this is not great nor hard to be made by Nature, for the sap running up plentifully within the same coat; two or three stalkes rise within the same coat, and the several flowers springing out at the top must appear in the form of an Oxelip; which has a stalk so much bigger than a Primrose stalk, by how much it has more flowers: for a Primrose stalk is very slender, and that very great. In Sicamores, Willows, and Ash-trees, it is not unfrequently seen that two or three branches by the luxuriancy of the sap, do in like manner run up united into one bough, where-

whereby its roundness and shape receive a very pretty alteration. And it is usually believed that divers single flowers may be changed into double by frequent transplantations, made into better grounds. I knew those that have had the wood Anemonies, and Colchcums double, who affirm that they took them into their garden wild, and single, and that that change was made by the soyle, and culture of the place.

For the animal Kingdome, the instances of transmutation are in silk-worms, cadix, and all caterpillars, which after a long sleep from the reptile, turn into the volatile kind.

The mineral Kingdome is supposed to be famous and fruitful in these changes, the hope of the Philosophers stone, or perfecting medicine requiring this belief: Yet I am perswaded that in many of their changes they rather separate, and bring to appearance a latent mineral, than produce it by the transmutation of another into that nature. *Sennertus* recants those writings of his, that affirmed Iron to have been turned into Copper by natural and artificial waters of Vitriol. The effects only in his second, and more mature judgment, being the separation of a Copper before latent in the Vitriol, and the precipitation of it by the parts of the Iron: and I have seen some experiments made by the honourable Person, for whom I am now writing, that have added strength to my former perswasion,

swasion, particularly the supposed transmutation of quicksilver into lead, published as real by the learned *Untzerus* and others, and to be made by dissolving the quicksilver in *Aqua fortis*, and precipitating it by the tincture of Minium, proved but sophistical, the Lead produced that way being indeed not made of the Mercury, but only reduced out of the tincture of Minium, wherein it lurketh, as that Gentleman doth more circumstantially set down in his own papers. The process that he cites out of *Untzerus* is this, Take, says he, ashes of Lead, or Litharge, or Minium, poure on it phlegme of Vinagre, and mace-rate it therein for a night, then dissolve Quic-silver in *Aqua fortis*, and into this solution let fall some drops of the forementioned Vine-ger, and immediately there will precipitate to the bottome a pouder which reduced in the fire to a Metal, will turn into Lead. And others there are of the like nature, which it were not proper here further to insist on.

It is a question, whether there be any real transmutation, from the Vegetable, to the Mineral kingdome, in petrifaction of any sort of wood, Those petrifactions, which I have seen in *England*, are made thus, some particles of stone, that impregnate the body of water, make a crust about the stick that is to be petrified, and enter into the pores thereof, as fast as they are layed open by the water, wash-ing through the stick, wherein there inter-ceeds,

ceeds, no change of the same parts, but by addition of some, and subtraction of other, if I perceive aright the new effect is wrought. The proof whereof may be, that the fibres of wood appear visible, and to the touch and taste amdst the body of the stone.

In Ireland there is a Lake, wherein (as that Noble Person I but now mentioned, hath related to me) there is so great a petrifying faculty that the best whetstones used in that nation, are made of wood, cast therein to be petrified. In which stones, though all the lineaments of the woody fibres remain, yet they are indued with the hardness, and other qualities of an exact stone. And Coral, the entire stonynes whereof no man can doubt, may well be imagined to be originally a vegetable bearing root, stalk, and leaf; and that afterward it is turned into its hardness by the peculiar property of the water: whether these operations of nature are likewise perfected by addition and subtraction of parts only, or whether it be required that some parts for the production of this effect be transmitted, I shall not determine.

And for the deciding the whole question, if the form be specifical, and so made by the aggregation of a certain number of accidents; those accidents and that number must be assigned that are thought enough to compleat a new form, before we may begin to judge in this matter. For that very many accidents may

may be changed, it appears by the above-named instances in Vegetables, and in other bodies many more: Vineger and Wine, are the same parts transposed, and yet there seems to be more difference between them, than between Endive and Cichory, Maidenhair and Scolopendrium, Rubarb and Dockes, which are in Vegetables esteemed for divers species, formally or specifically distinguished.

### Num. 7. *Of Provision for Seed.*

Many Roots are to be transplanted at the latter end of the year, and will bring forth perfect seeds: as Carrets, Parsneps, Turneps. Cabbages are to be laid in Cellars all Winter, the root and Cabbage being replanted in the spring, which is esteemed the best, as it is the most chargeable way of procuring seed; or the seed may be got, though not in so plentiful a manner, from the stalks of Cabbages, whence in the season the Cabbage was taken; those stalks being either replanted or standing in their old places: Those that intend to provide their seed this way, had best cut off their Cabbages as near the head as they can, and to cut the stalk slopewise upward, and not directly cross the stalk that so rain may run off, and not rot the stalk whereon the seed is to be born; Coleflowers give their seed from the like care that is bestowed on the Cabbage.

I have

I have seen Gardiners that provide Cabbage-seed in great quantity for the shops in London upon their course ground, to sow Cabbage-seed, which without transplantation shall bring forth Coleworts for boyling her and then a crop of seed: many Plants that bear fruit, bring their seed every year in the fruits, so Apples, Pears, Plums, Peaches, Apricots, Wheat, Barly, Rye, Pease, Beans, and many that bear no fruit do the like, so Lettuce, Radish, all grasses, so that unless some peculiar Plants which require to be excepted (For Yucca Indica, bears neither flower nor seed in less than four years time) 'tis general that each seed will ripen every year, and the best general token of maturity is its loosing from the pedal, by which it is joyned to the stock, so as kernells in ripe Apples grow loose from the core.

Those persons that make Verjuice or Cider can best furnish him that intends a Nursery, for notwithstanding both the violence of Mill or Press, the kernels escape entire enough for Vegetation; but care must be had that they be immediately sown after the pressing, lest being laid on a heap they heat, in the manner of wet Hay, and burn the germen of the seed which in the moisture of the bruised fruit by that heat, will prematurely sprout forth to see its own perishing.

In providing Lettuce-seed, mark the Plants that you see strongest for seed, and after they have

have begun to shoot stalks, strip away the lowest leaves, two or three hands breadth above the ground, that by them the stalk be not rotted.

Let Carnation and Gillyflower-Cods of seed stand upon the Root so long as you may, for danger of frost, then cut the stems off with the Cod's on them, and dry them so, as not to loose the seeds; The dryness of the Cod's, and blackness of the Seed, is an Argument of ripeness: *Ferrarius lib. 3. cap. 15.* Reports, that the bottome of every Cod brings the best seed: and the largest flowers.

Another rule for Carnations is, That if you would have good seed, you must not suffer above five or six flowers to be upon a stalk, and these must be the top flowers at the first flowering, for those that come single are generally the heads of the under slips.

The seed of Crocus's are only, or at least, best taken from the ordinary stript vernal Crocus, the great purple Crocus, the great blew Crocus of Naples, the stript purple, the leſs purple, flame coloured, the purple with small leaves, the yellow stript, the cloath of Gold.

Clover-grass and seeds of that nature, are provided by letting the grass run timely to seed, particularly by mowing it about *May*, and thence abstaining till the seed is through ripe.

Such seeds as are weighty, and sink in wa-

ter are best; the contrary are usually languid and unfit for propagation.

Out-landish seeds are used for such Plants, whose seeds cannot be got here for want of Maturity, or any other reason.

The Spanish-Musk-Melon-seed is accounted best, though we use our own with good success: few Gardiners here will use their own Onion-seed, for they find it runs to Scallions: Myrtle with us comes not to seed. For the sensitive plant, the Amaracoc or Passion flower, &c. we send for seed to the Barbado's.

What advantage our Nation might have by propagation of exotique plants by seed, brought new from several Countries beyond the Seas, it is hard to guess; that there would be advantage it is certain. I remember that *Bellonius* a man very diligent, and much employed about knowing the nature of Plants growing in other Countries than his own, which was *France*, wrote a whole book to shew the possibility and advantage of this improvement, to perswade Merchants to furnish Gentlemen with seed, and them to use it. 'Tis known that Peaches, Apricots, Nectarines, were lately not only strangers to *England*, but to *France* likewise. Mulbery is likewise an Exotique plant, and by King *James* his Command sent for over and propagated by seed.

Exotique seeds are good not only to propagate Plants, yet not with us, but likewise

to make a more plentiful production then can with ease be made from any other way of propagation of such we already have.

Care must be had in sowing seed, or at least in setting them, where you intend that they shall thrive, that the ground bear the best proportion may be to the places and particular Minera of the places where such plants in other parts use to grow, not to put mountainous plants in low and moist grounds. Why the Taurick Cedars, were they planted in *Wales*, should not grow, I know noe reason.

It were worth the while to consider in all seeds, whether there be no distinguishable difference in the seed, that may be of use, as to sooner or greater growth. In the same bed divers seeds being sowed of one kind, particularly Apples, Pears, Plums, Cherries, or Peaches, some Apple-seedlings will in the same mould and distances, much out-shoot the rest of the same kind, and so in the Pears, and other kernels: it might here be enquired, whether the great or lesse send bigger Plants, and of speedier growth? as it is by some observed in buds, that the fairer the bud is upon the shield, and stronger, the better thrives the *incapsulation*, and not only grows more certainly, but more lustily.

2. Whether the Canker in pippins, arise not from an incongruous grafting, and it were not better to bring them up from ker-

nels, or graft them on a more mild stock than that of a Crab.

Whether there might not be gotten divers years sooner trees of stature from kernels of great bodied, and quick growing Apple trees, and such whose kernels vary not much their kinds, than from Crabs, which is a wood of a slow growth and harsh Nature.

**Num. 8. *The manner of growing by Seed.***

The seed is considered either as already made, or as it is under the hands of Nature, imperfect, yet in the way to be made.

In it made, there are considerable, first the Coates and Cotton that cover it about, and preserve it from injuries; secondly, the essential and proper parts of the seed it self.

Many seeds have two Coates above the Cotton, and one thin one under, next investing the seed, such are Sicamores.

All seeds that I know have within their Covers actually a Neb, which answers to a root, which is joyned to leaves more or less in number: betwixt the stalks of (or amidst) these leaves there is a bud, eye or Germen, just opposite to the Neb, or initial Root, but by reason of its smallness it is scarce discernable in many seeds till it begins to spring.

1. Most Plants have only two leaves actually joyned to the Neb, which are commonly very unlike the proper leaves of the Plant;

of

of this sort are the flowers of the Sun, Edissatum Clypeatum, Cucumbers, Melons, Amanthus, Thistles, Thlaspies, Mallows of divers kinds, Arch-angels, Spurges, Nettles, Clary, Orach, Dill, Parsely hath two leaves dissimilar, but not much so, Melilot two dissimilar, and one, if I mistake not, similar.

2. Many Plants have more Leaves in their arising from the Neb, as Cresses have six.

3. Some Plants have but one dissimilar leaf, as Anemonies, Tulips, Fritellaries, and all bulbous spring flowers that I have observed. Wheat, Barly, Rye, all grain and grasses that I know have a germen wrapped up at one end of the grain in a hose or sheath, which germen consists of leaves wrapped about the bud by a plica or folding made the long way of the leaf, not overthwart as in Sicamores, Maples, and other complicated leaves of seeds. Nor doth the whole corn divide it self into leaves, and coats or husk, as in those examples, but the greater part thereof contains a meal, which by the heat and moisture of the soyl is turned into a pappy substance not unlike the Chyle found in the lacteals of animal bodies, and may be, as I suppose, repos'd nourishment for the young blade at such a time as the Earth would prove but a dry Nurse. I have taken notice that Carnations come up sometimes with three, sometimes with four leaves, though the most have but two: and it is Mr. *bobarts* observation, that

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such as come up with more leaves than two, provide double flowers, which if it generally holds true, it were a compendious way to weed out all the rest at the first coming up, to avoid the labour of culture of such Plants as in the end will not prove advantageous for profit or pleasure.

Beans, Pease, Kidney-beans, Lupines, have this peculiarity, that the grain being cleft, each half is as one of these dissimular leaves, which is usually contained in every seed, and between these thick leaves are contained other similar leaves, or such as differ but in growth or bigness from the true leaves of the Plant. 'Tis to be observ'd in all these great seeds, that though the pulse, or thick part of the grain perish, yet if the Neb and small leaves are entire, the seed may prosper; as I have seen Field-beans that have been eaten through with worms, prove good thriving seed. But 'tis reported, that Pismires have learned the wit to spoyl the seed from growing in their store-houses, by biting off the very Neb before they repose the grain. I confess I could never find any of their store-houses to learn the Truth of this, and divers other observations, which makes me question, whether ours be the same kind of Ant which is mention'd by King *Solomon* as so diligent and foreseeing a provediteur.

The growth of the Plant from the seed is thus; by convenient moisture and heat, the

Neb

The manner how Plants grow from Seeds. 72

Neb strikcs through the Covers, and goes directly down, if not impeded, in earth or water, a convenient way, ordinarily, two or three inches, in which time the leaves either rowled up, or otherwise inclosed, break their bonds, and explicate themselves, being lifted commonly a l ttle higher by the growth of the stalk, or lengthned Neb ; and you may observe, that the growth above ground, at the first motion upward, is nothing proportionable to the motion downwards. The truth is the Hypothesis of Sir Kenelme Digby in his Discourse of the Vegetation of Plants, p. 18. 19. seems to contradict this, where he tells the Royal Assembly he spake to, That *as to the bean, although the swelling and bursting forth of the fiery and Viscose parts of it, be towards all sides, according to the Nature of fire which streameth out from the Center every way to the Circumference, yet it will be efficacious upwards towards the Aire, because it meeteth with less resistance that way, then any other; For downwards the Earth lyeth more compacted then it doth over the grain, &c.* His conclusion therefore in the next page is this: *Upwards then, and towards the Air must be the speediest and greatest concourse of these hot and viscous streams, which coming into the Air, contract themselves into a circular stalk.* I can only say in all my Experience, though I am loath a person so excellently learned should be found mistaken in any circumstance) That a Bean, or any other seed that I know, being laid

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(suppose) half an inch under the surface of the Earth, will at its growth strike a root two inches downward to one inch it goes upward, 'Tis indeed more likely it should stert its stalk the more easie way through the yielding Air, but more useful that it should strike downward for the more firm rooting of the Plant, and the provision of a receptacle of juice for the life and growth of all the super-structure. And this more useful course has been, and is the way of Nature in the Bean it self, and other Plants, insomuch as they have fallen under my observation. After the root is well made and fastned betwixt the leaves that were actually contained in the seed, then and not before, there arises into more plain sight and appearance, that little Germen before, in many places scarce seen, like to that bud, which is left on Plants in winter, which springing, brings forth the true leaves and branch of the Plant sown.

If I am enquired of, whether each seed has a compleat essence and distinct form of its own. Nay further, whether it be a true and perfect Plant ? I must say that I have found it so to be, even more than an egge, a living thing, and immediately nourishable ; It has root to grow, body to bear the port of the Plant, Bark to direct the Sap into all its parts, and germen or bud to secure the means of future growth, and to shoot leaves, which is all and somewhat more than in the winter, the sturdiest Oke can boast of.

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It has been accounted an Interest in Philosophy heretofore, and that in our Schools, that seed should not be esteemed an actual and formal plant, because of divers absurdities, that if seed were animal, would happen in their School doctrine; as that there would be pluralities of formes in the same trees; The Soul might be divisible into parts; The same thing might be agent and patient; Nay some have said, that it might be of dangerous consequence in Divinity, if it were granted, that seeds had the actual forms and essence of that thing whose seeds they were.

But this I am sure of, that Truth can have no bad consequence, and am content that it is no Heresie now to appeal to sense from a Doctors opinion, and that I may freely in this matter require to be tryed by my Garden, though it be against the sentence and judgement of the Doctors of *Conimbra*, *Suarez*, *Ruvio*, *Pererius*, *Bonamicus*, *Fonseca*; and that we begin to lay aside the fear that from a certain truth, ill consequences may arise: That Canon will certainly hold longest which is best built in the bottome.

It is conceived by some, that the immediate cause of the growth of the seed, is the Spirit working upon the Salt and Sulphur, Earth and other constituent parts or Elements of the Seed: For the Spirit is supposed to be made Volatile by the heat of the earth and water, which in Spring and Autumne, (the chief

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cheif times of germination) is of a proper temperature for fermentation; and then the spirit being so Volatized, and rising up and expanding it self every way augments the whole Plant, and distends the sides of the seed, whereby the growth of the Seed-plant is effected.

But how it comes to pass, that the conveyance of these expanded particles is ordered to proceed, according to the lineaments of each Vegetable, no person to my knowledge who offers only at the History of the propagation of Vegetables, has yet made any concern, and it being beyond any ocular discovery of the most accute Searchers, to find out the Conduits or Truncks serving to so intricate a carriage, and how it comes to pass, that a seed first, hath its Neb thrust down without dilatation of the sides, and then, how the upper part of the Neb or germen orderly framis the Vegetable above ground in so trim a body, rather then a confused mass, neither can nor do I take it for any part of my task to declare.

I may possibly by some be thought severe in judging that the causes of these appearances have not been yet resolv'd. But it is Solomons speech, Eccles. 1. That which is wanting cannot be numbered. I confess that for all the causes and wayes of production, explain'd either by Sir Kenelm, or other our Noble wits, I see no reason but why even by

\* *Since Green & Malvighius &c*

granting

granting the Sun, and all the Elements, to have the operations supposed by them, Their Oak might bear Pippins as well as Acorns, why an Acorn might not produce a Tree with leaves like a Cabbage as well as those proper to the Oak. For those general causes they are wont to alledge, seem not to me, nor to any reasonable man, sufficient to produce the particular specifications of so many thousand Plants, that in all grounds and Climates, continue in and keep their Natures, and to produce their own kind without any notable alteration; the Sun may distend or dilate the fruits, or flowers, or leaves, by rarifying, and drawing plenty of juice, but if there be any other power beside that particular and Specifick one that was given to every Plant at the first Creation, able to variegate the leaves, and flowers, and seeds, and barks, and woods of every Plant answerable to the vast variety there is in them; I confess it is a power that I never yet was so learned or so happy as to understand.

I shall likewise leave it to the imaginations of Philosophers to determine, whether upon the distention made, it be by any elective faculty in the Seedlings, filled up with similar parts drawn from the Earth, and so by nature originally fitted specifically for that Plant: or whether there being a continual motion of particles from the earth, pressing upon the Plant, those only get entrance whose shapes and

and figures are such as correspond to the pores in the young Vegetable; which meeting in the body of the Plant, with its constituent parts in nature, not unlike themselves, they easily are joyned thereto, and so cause an augmentation in the whole: or whether dissimilar parts, either to fill up the Vacuum made by distention, or for other reasons, go up into the Plant, do obtain there a change of nature, and from the form, Soul, *Archetypus*, or other principle, are altered from their first being, into a likeness of nature with the Seedlings, and become homogeneous to it; These are questions, in the determination of which, till I am better informed, I desire to take no side.

*Num. 9. Of the cause of Greenness in the leaves of Vegetables.*

*VB* It has been made a question by some, what it is that causes greenness in all Herbs, especially such whose seed, and the stalk, and leaf contained therein are white, and whether the cold beating of air and water upon Vegetables may not have some influence in the production of this effect.

I truly have been tempted to think the affirmative, which is that the coldness and briskness of the free aire, in Plants that grow in the land, and the like quality of the water, in water plants produces the verdure or greenness,

greenness, that is generally the beauteous Vesture of all Vegetables, or at the least has some considerable influence as to this production: for by experience I have proved that Plants being in a close room, brought up from seeds in pot, or otherwise, the leaves and stalks prove to be white, or pale, and not green, which is according to the Lord Bacon's experiment, who *Cent. 5. Exp. 47.* setting a Standard Damask-Rose-Tree, &c. in an earthen pan of water, where bearing leaves in the Winter, in a chamber where no fire was, the leaves were found (as his Lordship relates) more pale and light coloured, then leaves use to be abroad; which paleness, I suppose to be greater or less, proportionably to the freshness and freeness of the aire that the plant enjoys. Grass will likewise change its colour, if by any weighty body, or other lying upon it in the field, it be kept from the aire. The truth is, all Plants have peculiar delight in the aire, which I have proved by this Experiment; I have taken young seedlings in a pot, and put them in a window where there was a quarry out, the seedlings would immediately leave its upright growth, and direct its body straight to the hole, and so become almost flat and level with the earth in the pot: Then turning the pot so, that the inclination of the stalke might be from the hole, the Plant has then crook't it self in form of a horn, or the letter C. to the aire

78 The cause of Greenness in leaves.

aire again. Upon the second turn of the pot, and the upper horn being placed from the air, the Plant would, with its upper part, return to the open place, and leave the stalk now in the form of an S. Nay, sometimes I have bin persons tell me, which way they would have such a Plant grow; they have marked the place in the brime of the Pot, that mark have turned to the hole in the window, by which means the Plant without any force, and that in not many hours space, hath inclined its stalks to the mark made.

That the aire has great influence in producing the verdure of Plants, may likewise not improbably be argued from the Experiment of Blanching, or whiting the leaves of Artichokes, Endive, Mirrhis, Cichory, Alexanders, and other Plants; which is done by keeping of them warm, without the approach or sentiment of the cool and fresh aire; whereby all Plants that otherwise would bear a green colour, become exactly white.

Hence it may likewise be, that the roots of most Vegetables that are under ground, and covered from the aire, are white generally, whereas the stem, and upper parts of them are ordinarily green, and many roots that are by nature of a peculiar colour, as Radishes, yet the point of the root that is deepest in the ground, retains a whiteness, as well as other roots, being in that part of the root removed from the aire, the red part commonly standing

as otherwise in y<sup>e</sup> Carrot.

standing above or just in the surface of the earth.

Hence also it may be, that those leaves of Cabbages and Lettuce that are expanded in the free aire are green, those that being covered with their fellows, and secluded from the blasts of wind and weather, and kept in a warm Covert, become as white as any thing that is artificially blanch't.

True it is, that there be Plants that grow in the bottome of waters, and so cannot be supposed to have this help from the aire, otherwise than as the aire chills the water, and the water having received this quality from the aire, makes the like impression upon its domestique Plants.



## C H A P. II.

### Of Propagation by Off-sels.

Of this way *Virgil Georg. 2.*

*Pullulat ab radice aliis densissima sylva,  
Ut Cerasis Ulmisque; etiam Parnassia Lauru-  
Parva sub ingenti matris se subjicit Umbra.*

*In mighty Groves some spring from their own root,  
So Cherries, Elms, Parnassian laurel, shoot,  
Which small, in great shade of their Mother rise.*

Num. 1. A Catalogue of Plants which may  
be Propagated by Off-sels and Suckers  
arising with Roots from the stool and  
Root of the Mother-Plant.

*Aconite or Woolfs-bane.*  
*Adders-tongue.*  
*Alexanders.*  
*Anemones.*  
*Angelica.*  
*Aristolochia.*  
*Artichockes.*  
*Asphodels.*  
*Astarium.*

<i>Asparagus.</i>	
<i>Avens.</i>	
<i>Barberies.</i>	
<i>Barrenworth.</i>	
<i>Bachelors-buttons.</i>	
<i>Bawme.</i>	
<i>Bears-ears.</i>	
<i>Water &amp; wood Betony.</i>	
<i>Bistort.</i>	
	<i>Spanish</i>

Spanish Broome.	Dittander.
Butchers Broome.	Docks-tooth
Brooklime.	Dockes.
Briony.	Dorias his wound wort.
Burts, and such like	Dragons.
Apples.	Dulcamara, or woody Night-shade.
Bugloss.	Egrimony.
Burdock.	Elmes.
Burnet.	Elicampane.
Calamus Aromaticum, which requires moi- sture.	Everlasting Vetch.
Canomill.	Ewe.
Caltha or March-Mari- gold.	Fernes.
Cherries where the stock is not grafted.	Feverfew.
Cbives.	Figtrees.
Cinquefoyle.	Filbeards.
Clownes all-heal.	Filipendula.
Costmary.	Flowers-de-luce.
Cowslips.	Fleuellen or Speedwell.
Comfrey.	Fraxmellis.
Cowslips of Jerusalem.	Galingall.
Coltsfoot.	Garliques.
Columbines.	Gentianella.
The Crown Imperial.	Germanander.
Crowfoot.	Globe-flower.
Cuckowpints.	Gooseberries.
Damnes-violet.	Golden-rod.
Dayfies.	Ground-Ivy.
Dens Leonis bulbosus.	Hasel-nuts.
	Harts-tongue.
	Herba-paris.
	Helleborine.
	G Hellebores.

Hellebores.	Mulberries.
Hercules all heal.	Mugwort.
Hyacinths.	Nurse-gardens.
Horse-radish.	All sorts of <i>Orchis</i> ,
Houseleek.	Docks-stone.
Horse-mints.	Petasitis.
Hops.	Periwinkle.
Horse-taile.	Peony.
Jasmine.	Pease.
Jerusalem Artichoke.	Pilewort.
Kentish-Codlings.	Poplars.
Knapweed.	Potatoes.
Lovage.	Prunella.
Ladies bed-straw.	Primroses.
Lilies.	Pulsatillas.
Lilium Convallium.	Raspes.
Lunaria.	Radix cava.
Lungwort.	Reeds.
Mandrakes, for often there may be taken from them particles of their roots, which will grow well, though the usuall way of their propa- gation is by seed.	Roses of most kinds.
Marshmallows.	Ruscus, or Butcher- broome.
Matherwort.	Rubarbs.
Madder.	Satyrions.
Mints.	Saponoria.
Moly.	Sanicle.
Monks-hood.	Scabious.
	Sedum.
	Serpillum.
	Setfoyle.
	Shallot.
	Skirrets, though seed will produce better
	Smallage.

<i>Smallage.</i>	<i>Vervaine.</i>
<i>Sorrels.</i>	<i>Times.</i>
<i>Solidago Saracenica.</i>	<i>Violets except the yellow.</i>
<i>Solomons Seal.</i>	
<i>Some Spurges.</i>	<i>Water-mints.</i>
<i>Stickwort.</i>	<i>Water-lillies, and most of the other water Plants.</i>
<i>Strawberries.</i>	
<i>Sword-flags.</i>	
<i>Tarragon.</i>	<i>Winter-Cherries.</i>
<i>Tansy.</i>	<i>Willow-weeds.</i>
<i>Thistles.</i>	<i>Woolfsbane.</i>
All sorts of <i>Tulips.</i>	<i>Wormwood.</i>
<i>Valerians.</i>	<i>Tarrow.</i>
Some <i>Vetches.</i>	

Some other roots may likewise be divided which send forth no natural off-sets, as the Cyclamens particularly, which being quartered, do not unusually recover the wounds made; and procure by the issuing of the sap, a new bark for their defence; but these methods being hazardous, because of rottenness incident to them after such divisions, few gardeners will change the certainty of one entire great root for the doubtful hope of this projected quadruple encrease: when otherwise they may in time have much greater from the seed, without any peril to the Mother-Root at all.

Num. 2. *The way of making Off-sets by Art.*

Nature usually provides this help of Propagation, without the wit or industry of men, called to her assistance, but that not generally in all Plants, nor alwayes in any one: and therefore I esteem it well deserving any mans learning who delighteth in Gardens, to know any means to enlarge this way of Propagation beyond the bounds it is carried to by natures course; There is a pretty way (which in truth I first learned from Mr. *Bobart*, our Physique Gardiner) for the making Off-sets where nature never intended them; which is done by bareing the root of Plants of woody substance, and then making a cut of the same fashion with that which is made in laying: Into this cleft a stone must be put, or something that will make the root gape, then cover the root over three inches with mould, and the lip that is lifted up will sprout into branches, the root of the old tree nourishing it. When the branches are grown, cut off this Plant with its Root to live of its self.

If you can, leave an eye on the lip of your root, which you after the incision lift up; for the branches will then more speedily and certainly issue out of the root so cut.

In Bulbous Roots, *Ferrarius* makes off-sets thus: If (says he) a Bulbous root is barren of Off-sets:

Off-sets: either put it in better earth, or cut it upon the bottom, in the crown of the root whence the fibres spring, and that but lightly with your naile, and sprinkle some dry dust as a medicine to the wound; and the effect he affirms to be this, that so many wounds as you shall make, into so many off-sets shall the genital vertue dispose it self.

*Num. 3. Rules for direction in taking off Suckers, or Off-sets.*

Care must be had, that the Dame be not destroy'd in her delivery from her new brood, which may easily be done, if too great a wound be made upon the stool, or mother-plant, by tearing of the Suckers. 'Tis *Ferrarius* his peculiar precept about Anemones: That they be sure as to take off such Off-sets that will scarce hang on, so not to tear off such as hold fast to the Mother-plant, for that would be to the peril both of the Off-sets and Mother-plant. Yet I have seen the very substance of Sowbreads to have been divided with a knife through the heart, and yet grow well on either part, when they have not afterward been over glutted with wet. Flags, Bears-ears, Primroses and Cowslips, and generally all roots, that are not Bulbous or tuberous must have, and do require a violent separation, but the less the wound is, the

## 36 Examples of Planting by Off-sets.

better shall your Plant thrive, and be less subject to corrupt by the moisture of the earth.

In the replantation there is required the general care of young sets, all Plants of fibrous roots are assured in their growth, by convenient watering, but for bulbous and tuberous the Gardiners hand is, and ought to be more sparing, because that moisture is a peculiar enemy to these Plants, and often rots them, if it get into any cranny of their roots.

### Num. 4. Examples of Planting by Off-sets, of Hops, Licorice, Saffron, Skirrets.

The Hop being one of the most useful Plants that are propagated by Suckers, or Off-sets, I shall begin with *Hoppe*, the Culture of it, And shall give *Licorice*, my Planter such instructions for the whole Manage of this Noble Vegetable, as I have learn'd from the Observations of Planters that have made (I speak within compass) above 200 pounds in a year of an Acre of Hop ground, cultivated with the Expence of 10 pounds per Acre, as themselves have related it to me. I mean my Hop-Masters at *Farnham* in *Surry*, and thereabouts. And yet I intend not to derogate from the Instructions and Directions given by Mr. *Blith*, but where just reason, and the practice of the places where such observations have been made, shall necessitate me so to do.

Mr. *Blith*

Mr. Blith directs not amiss when he orders thus---- In *March* if you have not pulled down your hills, you should with your Hoe, as it were, undermine them round till you come to the principal root, and take the upper or younger Roots in your hand, and discerning where the new roots grow out of the old sets, of which be careful, but spare not the other ; but in the first year uncover no more but the tops of the old sets, but cut no roots before the end of *March* or beginning of *April*. The first year of dressing, you must cut off all such as grew the year before within one inch of the same ; and every year after cut them as close to the old roots ; those that grow downward are not to be cut, they be those that grow outward which will incumber your garden, the difference between old and new easily appears ; you will find your old sets not increased in length, but a little in bigness, and in few years all your sets will be grown into one ; and by the colour also the main Root being red, the other white ; but if this be not early done, then they will not be perceived : And if your sets be small, and placed in good ground, the hill well maintained, the new Roots will be greater then the old ; if they grow to wilde Hops, the stalks will wax red, pluck them up and plant new in their places.

At *Farnham* they generally begin to Pole their Hops about the latter end of *March*,

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sometimes sooner, sometimes later, according to the forwardness or backwardness of the Spring. In hilling and poling, this rule is generally observ'd, That if the Center or middle of your hills are five foot asunder, then three Poles will suffice each hill, otherwise if they stand nearer, two Poles may be sufficient. In some places they pole them before they make their hills, and in some places after: At *Farnham* they make their hills commonly when they cut and cleanse the Hop roots from the suckers, namely at the beginning of *March*, and Pole them in an ordinary spring about the latter end of the same month: But Mr. *Bliths* directions are to make the hills after that they are Poled, and tied to their poles, when says he your Hops are grown two foot high, bind up with a rush or grass such of your springs to the Poles as do not of themselves, winding them as oft about the Poles as you can, and wind them according to the course of the Sun, but not when the dew is upon them, your rushes lying in the Sun will toughen, says he, but surely better in the shade.

And now you must begin to make your Hills, and for that purpose get a strong Hoe of a good broad bit, and cut or hoe all the grass in the borders between your hills, and therewith make your hills with a little of your mould with them, but not with strong weeds, and the more your hills are raised, saith

faith he, the better, the larger, and the stronger grows your Root, and bigger will be your fruit. But this Rule is not subscribed to at *Farnham* where they esteem their Gardens best order'd where the hills are made greater or less in proportion to the strength, and bigness of the Hop-root.

And whereas Mr. *Blith* orders that from the time of the making of the Hills, the Gardiner should be ever and anon raising his Hills, and clearing his ground from weeds until the time of gathering; the observance at *Farnham*, and divers other places, is only this, That in the beginning of *August*, or latter end of *July*, about the time that the Hops begin to blow after a good rain, they rake up earth from the spaces, and renew the hills again.

In the first year suppress not one Cyon, but suffer them all to climb up the Poles, for should you bury the springs of any of your Roots it would die, so that the more Poles are required to nourish the Spring.

But after the first year saith Mr. *Blith*, you must not suffer above two or three others, say not above four or five stalks to go to one Pole, but pull down and bury all the rest. Yet you may let them grow four or five foot long, and then choose out the best for use. As soon as your Pole is set, you may make a circle how broad your hill shall be, and then hollow it that it may receive the moisture, and not long after proceed to the building of your

your Hills. What he adds, that where your Hops are highest, there you must begin again, and pare again, and be alway paring up, and laying it to the heap, and that with some mould until the heap come to be near a yard high, is contrary to the practice both at *Farnbam* and other places: For the highest Hills they make, are not above half a yard, or two foot high at most, neither do they tye themselves to such continual attendance in paring and adding to the Hills.

It is a question, whether if the Hop attain not to the top of the Pole by the midst of *July*, it be not good advice to break off the top of the same Hop, that the rest of the time may serve to nourish the branches, which otherwise would loose all the running up, being no advantage to the stock or increase of the Hops. Mr. *Blith* holds the affirmative part, but others there are who do assert the negative, and alleadge for their reason, that they find by experience that the beating of the tops in this manner, maketh the Hops bleed, and is very prejudicial to them.

At *Farnbam* also, which is accounted as good a soyle for Hops, and as secure from Blights as any in *England*: I find their Gardens planted not upon moist or boggy ground, but rather upon a marly loomy mixt ground upon the the declivity of their heaths, and the soyle they use is throughly rotten, for they have an observation, that if the Dung

which

which they employ about their Hills, be new and fresh, it certainly breeds the blight.

For the drying of their Hops, they do as soon as they are gathered, put them on a Kill, some use the same Kills which they employ for the drying of Malt, upon which, though they lay them near a foot thick, they will be dried in twelve hours. They must be dried without smoak, and therefore generally they dry them with Charcoal. But some under their Kill have an Iron furnace about two foot square, with a close grate, into which they put in Seacoles, and with a Vent or conveyance for the smoke, which Iron furnace being kept glowing hot with the Seacoles, gives heat enough for the Kill, nor doth the smoke of the Seacole annoy the Hops, because it is kept in.

Others in the Neighbouring Villages dry their Hops with wood that is light and dry, but in other Countries with Wheat straw, for generally they dry their Hops with the same Fuell that they dry their Malt, and use the same diligence that they be not prejudiced by the smoke.

Saffron delights in a reasonable *Saffron.* good and dry light ground, not extremely soyled or moist, 'tis planted chiefly in some parts of *Essex*, *Suffolk*, and between that and *Cambridge*, at *Saffron-walden*. They are set in the manner of Bulbous roots, being taken when the Bulbe is at the fullest, commonly

monly about Midsummer the Bulbs are set by  
a line, (that the beds may be weeded with a  
Hoe) and that either with a setting stick, or  
by trenches made in the manner of those  
wherein garden pease are usually sowed.  
This bears in the middle of the flower three  
chives, which is the Saffron, to be gathered  
every morning early and dried for use, every  
second or third year at the furthest the beds  
must be replanted, and the off-sets drawn  
away.

Skirrets are propagated usually by Slips  
taken from the head of the root, where many  
of them are set together with white strings,  
and these must be planted in very rich ground  
in *March* at a foot distance, or thereabouts,  
each Plant being kept Hoed afterward: at  
two years end they are taken up in great  
roots, and reserved to be eaten.

The general way of this propagation, is to  
take the off-sets that rise from the Bulbous  
and tuberous rooted Plants, as Tulips, Anemones,  
Narcisses, Crocus's, &c. and the  
suckers which from the roots of Poplars,  
Elmes, Nut-trees, Pears, Burts, Nursgardens,  
Kentish-Codlings, Gooseberries, Roses, Rus-  
cus, Calamus Aromaticus, are very plentiful-  
ly drawn, and more or less from all mentio-  
ned in the Catalogue *Nwn. I. Chap. 2.* and to  
replant them in the seasons of setting, which  
are related in the proper chapter for that  
operation, into proper beds, and in conve-  
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ent distances for their future aduacation and  
growth.

Num. 3. *Variety of colours in what Flowers,  
from what off-sets.*

Our Gardiners respect most the roots of widdows, for that they find by experience that they multiply the variety of Tulips not only from seeds, but from the Off-sets of these widdows: I my self have seen admirable declensions of them from their natural purple and white.

The royal Crocus striped, gives now and then very pretty variety from its Off-sets, as sometimes I have seen on the same root an ordinary striped Crocus, and another of a perfect flame colour, though the variety here be not so great as in Tulips.

And seeing it is evident that variety of colours sometimes cometh from the weakness of the Plant, some Art may be used to alter the colours, not only of Off-sets, and slips, but also of the flowers that arise from Mother Plants. For in Tulips, and Anemonies, and in Stock-gilliflowers, and divers others, I have seen the flower grow paler and more striped as the Plant hath been weakened. And Mr. *Rea* telleth us, that as the expert Gardiner endeavours to recover such sickly roots of choice flowers, so purposely he infects others with sickness that are more vulgar, by taking

44 *What Off-sets give Variety of Colours?*

taking up the roots a little before they come to flower, and laying them in the Sun to abate their Luxury, and to cause them to come better marked the year following: This, saith he, I have often done with strong and lusty roots of the Pass-Oudmard, Pass-Cittadel, Pass-Heron, Agot Robin, Turloon, Widdows, and such like ordinary flowers, and commonly found the success answer my expectation in many, and some of them to come so well marked, that they might be taken for much better flowers then they are: some think to produce variety of colours by grafting, or joyning artificially the stems of Carnations or Cloves of Tulips of divers colours. But this cannot hold, for every bud and clove that groweth will send forth leaf and flower after its own kind, as it happens in the inoculation and grafting of Roses, and other Plants.

Concerning the manner of growth by Off-sets, there is little to be spoken particularly, their roots being actually made while they remain upon the Mother-Plant, and their growth being like that of other well rooted Vegetables.



## C H A P. III.

### Of Propagation by Stems, Cuttings or Slips.

Of this way of Propagation *Virgil* speaks,

*Nil radicis egerit alia, summumque putator  
Haud dubitat terra referens mandare cacumen.*

*Georg. 2.*

*Some need no root, nor doth the Gardner doubt,  
That Sprigs, though Headlong set, will timely  
(sprout.*

#### Num. I. A Catalogue of Plants this way Propagable.

<i>Abrotonium Unguentarium.</i>	such Plants as break out into protuberan- ces like warts upon the bark.
<i>Balsamita.</i>	
<i>Barberries.</i>	
<i>Basil.</i>	
<i>Basil-mint.</i>	
<i>Bay.</i>	<i>Bugle.</i>
<i>Baume.</i>	<i>Cornelian Cherry.</i>
<i>Box.</i>	<i>Many Crowfoots.</i>
<i>Brooklime.</i>	<i>Dorcas his woodwort</i> being cut off near the root.
<i>Burrs, and generally all</i>	<i>Elder.</i>

96 *Plants propagable by Stems or Cuttings.*

<i>Elder.</i>	end of April, but best in February or March.
<i>Evergreen-Privet.</i>	Rue in a shadowy place
<i>Germanders.</i>	<i>Sage</i> , both English and French.
<i>Gilliflowers.</i>	
<i>Hysope.</i>	
<i>Jasmine.</i>	<i>Savory.</i>
<i>Kentish-Codlings.</i>	<i>Savin</i> in moist ground, and shadowy.
<i>Knot-grass.</i>	
<i>Lavander.</i>	<i>Scordium.</i>
<i>Lawrel.</i>	<i>Southernwood.</i>
<i>Marjerome.</i>	<i>Spearmints.</i>
<i>Marsh-mallowes</i> being taken up near the root.	<i>Strawberries</i> , and generally all Plants that have joyns upon creeping strings.
<i>Mastique.</i>	<i>Thyme.</i>
<i>Mulberries.</i>	<i>Tripolium.</i>
<i>Nursegardens.</i>	<i>Veronica erecta.</i>
<i>Penny-royal.</i>	<i>Vines.</i>
<i>Periwinkle.</i>	<i>Violets.</i>
<i>Pinks.</i>	<i>Wall-flowers.</i>
<i>Poliun montanum.</i>	<i>Watercress</i> in water.
<i>Prunella, or self-heal.</i>	<i>Withy.</i>
<i>Quinces.</i>	<i>Willow.</i>
Some <i>Roses</i> , as the evergreen Rose.	<i>Woodbine.</i>
<i>Rosemary</i> set before the	

Num. 2. *Explication of the manner of propagation by Stems cut off from the Carnations. Mother-plant, or slipt by Example and Rules for particular direction.*

For

For Example, I shall chuse to instance in Gilliflowers or Carnations, for which flowers observe this order. Seek out from the stems such shoots only as are reasonable strong, but yet young, and not either too small or slender, or having any second shoots from the joynts of them, or run up into a spindle, cut these slips off from the stem or root with a knife, either close to the main branch, if it be short, or leaving a joynt or two behind, if it be long enough, at which it may shoot anew. When you have cut off your slips, you may either set them by and by, or else, (as the best Gardiners use to do) cast them into a tub of water for a day or two: then in a bed of rich and fine mould, (first cutting off your slip close at the joynt, and having cut away the lowest leaves close to the stalk, and the uppermost even at the top) with a little stick, make a little hole in the earth, and put your slip therein so deep, that the upper leaf may be wholly above the ground. Some use to cleave the stalk in the middle, and put a little earth, or clay, or chickweed, which we more use, within the cleft: this is Mr. *Hills* way in Sir *Hugh Plat*; but many good and skilful Gardiners do not use it; then close the ground unto the stem of the Plant.

As for the time, If you slip and set them in *September*, as many use to do, or yet in *August*, as some may think will do well, yet (unless

they be the most ordinary sorts which are likely to grow at any time, and in any place, the most of them, if not all, will either assuredly perish, or never prosper well: the season indeed is from the beginning of May to the middle of June at furthest.

*Ferrarius* Lib. 2. c. 15. fayes, that from the Month of *February* to the middle of *March* (viz.) in the time of their germination, is the best time to slip this flower. He neither will have them slipt, nor twisted in the Root, nor Barly put under them to raise adulterous fibres, but only advises that they be cut off in a joynt. The truth is, both the Spring and Autumn are good Seasons for making out Roots, the latter requires that the slips be so early set as that they may have time enough to take root, before the coldness of winter. The former, that the Plant set in the Spring, may have taken root before the Sun rises to emit violence and parching heats, which are general Rules for Vernal & Autumnal settings.

Concerning the continuance of double Stock-gilliflowers more years then one, Mr. *Rea* writeth thus, Many are of opinion (saith he) that double stocks raised from seeds longer then the first year of their bearing flowers, are not to be preserved by any means, but I know by experiance they are mistaken. It is true, that commonly the old Plant being all run up to the flower, dyeth the next Winter, but the cuttings will grow and bear the next

Spring

spring following. All the Art is in setting them, which must be performed in manner following, first make choice of such branches as do not bear flowers, the which cut off some distance from the stock, so that they may not be too long, Then slit down the bark at the end of the slip about half an inch in three or four places equally distant one from the other, according to the bigness thereof, which peel as far as it is slit and turned up, then cut off the naked woody part close to the rinde that is turn'd up, make a wide hole, and set the slip therein three fingers deep, with the bark spread open round about the end thereof, then cover it, which being shaded for some time, and watered, if the ground be anything good, will grow and prosper very well: And certainly this is the best, and most absolute way to raise double stocks of any kind that hath been practised by any; and in the like manner you may cut and set slips of the best Wallflowers, Gilliflowers, or of any other woody Plant that will grow of slips.

Woody plants that bear leaves must be taken off, and planted some time between the fall of the leaf and the spring: Some prefer the planting them in the beginning, some at the going out of the winter about the beginning of *February*. Immediately when the great frosts break, at the first towardness to spring is a good season according to general belief.

*Experiments made of the success of the cutting  
off divers Plants set in water.*

Because in some disquisitions of natural Philosophy, there may some Matter of argument arise from Experiments of the conversion of Water into nutriment and substance of various and those very different Plants, whereof some are Hot, others Cold, some esteemed of a Fresh, others of a Salt nature, some in regard of mans body of Healing, others of Excoriating and Blistring qualities, some Specifiques for the head, and the Diseases thereof, others for the Heart, and others for the Womb: I shall set down the truth of some few Trials concerning the growth or corruption of such cuttings of divers Vegetables as without roots I kept in my chamber in Vials of water. Not designing thence to make any motion towards the Restauration of the ancient doctrine concerning the production of all things out of water, or to take up the scatter'd judgments of the once renowned *Ibales*, which he made from the observation of the Generation of fishes, and Petrification by this element, & likewise from the influence (for he was awas thereof) and causality it has in the production and nourishment of Vegetables, and (if not immediately) by consequence of animal bodies. Nor desiring to make from these Experiments

riments (though I believe the instance may be as well proper as specious) any argument for the more fashionable opinion of *Epicurus*, by shewing the various Productions that may be made by the divers Shufflings and Positions of that which has the repute of the most pure and defecated element, but clearly intending to keep to my task, which is History, and rather to serve, than to be the Philosopher: I in short rather content my self to give the Reader this account: That May 1658, in Glasses of water the Plants following grew from cuttings, and made themselves roots in the water, by name, they were *Balsamita minor*, *Mints*, *Sedum multifidum*, *Pennyroyal*, *Bugle*, *Prunella*, *Water-cress*, *Purple-grass*, *Periwinkle*, *Dorias his wound-wort*, *Crow-foot*, *Brooklime*, *Marsh-mallows*, *Bawrel*, *Scordium*, *Triplium*, *Knot-grass*, *Nummularia*, *Minima*, *Basil-mint*, *Curl-mint*, *Horse-mint*, *Panaxcoloni*, *Feverfew*, and some others which I kept no account of, I have had at other times.

Plants that upon trial made by cuttings May 1658, did not grow being placed in Vials of water, were *Mugwort*, *Rosemary*, *Stock-gilly-flowers*, *Alaternus*, *Lavander-cotten*, *Sage*, *Armeria's*, *Camomil*, ~~Camomil~~, *Polium-montanum*.

*Stock-gilly-flowers*, *Bawme*, *Tansy*, *Groundsel*, *Lavander-cotton*, *Sage*, *Majorane*, being likewise set in glasses of water dissolved into a muscilage, and so corrupted before they attained to any roots.

*Never seen y<sup>e</sup> contrary of <sup>the</sup> <sup>old</sup> <sup>way</sup>*  
*of Plants*

Plants that were corrupted by the water in some parts of the stems, and so died after leaves sent forth and roots shot, were *Basil*, *Mint*, *Marshmallows* after it had grown a span, *Panax-coloni*, *Balsamita minor*, after six weeks growing, which made me doubt whether there were not the same reason of the dying of these Plants, that there is of grafts of Pears upon Apples, or Apples upon thorns, which grow for a while, it may be some years but surely die before they arrive to any maturity: and secondly, whether this reason was not the unlikeness and diversity of parts between the stock to be nourished, and the nourishment apposed thereunto, for though some died after leaf and growth made, as purple-wort particularly by running into a Muscilage; yet generally there appeared no such evident cause of their failing.

Plants that increased in weight, small sprigs of them being cut and Planted in Vials of water, were these, and the quantity thus much.

*Sedum multifidum* in a month increased in weight, half a scruple: *Scordium* as much in a fortnight. *Dorcas his woundwort* grew in six weeks gr. 13. *Bugula* in some what less time gr. 15. *Water-cress* gr. 25. in a Month. *Ranunculus* half a scruple in six weeks, and *Periwinkle* as much. *Prunella*, *Brooklime*, and most of the sorts of mints, got weight proportionably.

There are some Experiments of that great Vertuose Mr. Boyle, which are very proper to be

be annexed here, and the Reader had not mis-  
sed to have had some intimation of them in  
my former Edition had that most ingenious  
and truly Philosophical Discourse, which he  
entitles his *Sceptical Chymist* been then pub-  
lisch't: And now that piece being in few hands  
and out of Print also, I shall give you the  
Relation of them at large, as I find them set  
down in the 107, and 108 pages. 'I, saith he,  
'caused my Gardiner in May to dig out a con-  
'venient quantity of good earth, and to dry it  
'well in an Oven, to weigh it, and to put it in  
'an earthen pot, almost level with the surface  
'of the ground, and to set in it a selected seed  
'he had before received from me for that pur-  
'pose, of Squash, which is an Indian kind of  
'Pompion that grows a pace; this seed I  
'ordered him to water onely with rain, or  
'spring water. I did not ( when my occasi-  
'ons permitted me to visit it) without de-  
'light behold how fast it grew though unsea-  
'sonably sown; but the hasting Winter hin-  
'dred it from attaining any thing near its  
'due and wonted magnitude, ( for I found  
'the same Autumn in my Garden, some of  
'those Plants by measure as big as my middle)  
'and made me order the having it taken up,  
'which about the middle of October was care-  
'fully done by the same Gardiner, who a  
'while after sent me this account of it; I have  
'weighed, said he, the Pompion with the  
'stalke and leaves, all which weighed three

‘ pound wanting a quarter, then I took the  
‘ Earth, baked it as formerly, and found it  
‘ just as much as I did at the first, which made  
‘ me think I had not dry’d it sufficiently:  
‘ then I put it into the Oven twice more, after  
‘ the bread was drawn, and weigh’d it the  
‘ second time, but found it shrink little or  
‘ nothing.

‘ Experiment 2. To give you an account  
‘ of your Cucumbers, I have gained two in-  
‘ different fair ones, the weight of them is  
‘ ten pound and an half, the Branches with  
‘ the roots weighed four pounds wanting  
‘ two ounces; and when I had weighed them,  
‘ I took the earth and baked it in several small  
‘ earthen dishes in an Oven, and when I had so  
‘ done, I found the earth wanted a pound and  
‘ an half of what it was formerly, yet I was  
‘ not satisfie<sup>l</sup>, doubting the Earth was not  
‘ dry: I put it into an Oven the second time,  
‘ (after the bread was drawn) and after I had  
‘ taken it out and weighed it, I found it to be  
‘ the same weight. So I suppose there was no  
‘ moisture left in the Earth. Neither do I  
‘ think that the pound and half that was wan-  
‘ ting, was drawn away by the Cucumber, but  
‘ a great deal of it in the ordering was in dust,  
‘ and the like, wasted.

To which he adds a third Experiment of  
the great *Van Helmont* in these words; ‘ He  
‘ took two hundred pound of Earth dried  
‘ in an Oven, and having put it into an Ear-  
‘ then

then vessel, and moistened with Rain water, he planted it in the trunk of a Willow-tree of five pounds weight: This he watered (as need required) with rain, or with distilled Water, and to keep the neighbouring Earth from getting into the Vessel, he employed a plate of Iron tin'd over and perforated with many holes. Five years being efflux'd, he took out the tree, and weighed it, and (with computing the leaves that fell during the four Autumns) he found it to weigh 169 pounds, and about three ounces. And having again dried the Earth it grew in, he found it to want of its former weight of 200 pounds onely, about two ounces, and having again dried the Earth it grew in, so that one hundred sixty four pounds of the Roots, wood and bark which constituted the Tree seem to have sprung from the water.

Num. 4. *The manner of growing by Cuttings.*

Such who desire to observe the working of Bees, get Casements to their Hives, that their eyes may not suffer impediment from the darkness of the place, For prevent on of the same hindrance, the use of beds of a Diaphanous soyl, in as Diaphanous bounds, or plainly of water in a glaſſ, I have found a proper remedy; and shall therefore from my obſervation of the growth of these particulars de-

fire the reader will imagine the rest, or judge them alike, as truly (for what I remember) I have always found them.

For the manner of Plants growing by wa-  
ter, I observed that those Plants that had ma-  
ny joynts, easily grew and put forth roots  
only just at the joynt. *Knot-grass*, *Crow-foot*,  
*Panax-coloni*, all sorts of *Mints*, *Penny-royal*,  
*Scordium*, *Bugle*, *Brooklime*, *Periwinkle*, which I  
conceive to be the reason why in setting them  
the practice is, to cut off the Plant just in a  
joynt, for so the roots immediately spring  
thence, and no part of the stem corrupts,  
which it would, if it were cut off at the grea-  
ter distance.

In those herbs where there were no exact  
joynts, the roots sprung forth under some  
buds, as in *Tripolium*, *Doriss* his woundwort,  
*Marsh-mallows*.

Every root that was made, came forth first  
very white and single, but afterward in very  
handsome order and proportions, from  
thence arose other fibres striking every way in  
the water, where the side of the Vials made no  
impediment to the growth of the spurs issuing  
from the first and original root.



## CHAP. IV.

### Of Propagation by Laying.

Num. 1. *What Plants are this way increased.*

The Plants that are usually propagated this way, are Vines, Woodbines, Myrtles, Jasmines, Mulberries, Savin, Roses, Horse-chesnut, Evergreen privet in Woods, all sorts of Willows and Sallows to fill up bare places. Of these *Virgil*,

*Sylvarumque alia pressos propaginis arcus,  
Expedant & viva suâ plantaria terrâ. Geo. 2.*

*Some Trees require their boughs beset arch-wise,  
And make their own soyle living Nurseries.*

Carnations, Gilliflowers, and among flowers generally all those Plants that will grow by Cuttings, will this way grow with much more ease, by care and good watering. Gardiners do apply this way with profit to such Plants, as cannot well by any other means be increased for want of seeds and off-sets, and by reason of the repugnancy of their nature to grow either by cuttings and Infusion.

Num. 2.

**Num. 2. The Example of this manner of Propagation.**

The most usual flower to be laid in Gardens, is the Gilliflower which every Gardiner here useth, and is thus performed; Take those slips you intend to lay, and cut the stalk just under that joyn of the slip, which is next the root or middle stem, or under the second joyn half way through the stalk: then slit it upward to the next joyn from that, under which you made your first incision, and put the top of a Carnation-leaf, or any other thing to hold open the slit, (though that be not altogether so needful, for the cut being made on the lower side, and the slip being towards the root bent down gently, as the manner is, and the top of the slip raised with mould, the slip will be open of its own accord and remain so if you place it well) at the first some peg down the middle of the slip with st.cks, that it may not rise from the posture in which tis first laid, you must remember to put good earth, enough to mould up your new Nursery, and to water it upon all occasions with water that is Sun'd, or in which Sheep dung is steep't, but so clear, as not to breed flie, lice, or other Vermine, and then in seven or eight weeks you may expect Roots.

*Num. 3. Requisites for the manner of laying.*

1. To laying, 'tis profitable, if not necessary, that you (in the season of doing this operation) cut the thing you lay, much in the manner you cut Gilliflowers, in laying them, enlarge the cut two or three inches long, more or less, according to the bigness of the branch, unless in some Plants that take any way, as Vines, and 'tis so much the better, if in Roses, and other Layers of a woody substance, with an Awle you prick the stock at the place laid, as it is done in propagation by Circumposition.

2. Another Requisite is, that during the time of drought, they be continually watered, and kept moist, otherwise they will make no exact roots, perchance only a kind of knob or button full of fresh sap upon the tongue of the cut in the branch laid down, yet I have found these branches cut off with watering in the summer, to grow well enough after their transplantation.

3. The season most fit for this operation, is, in the beginning of the spring or declension of the torrid heat of summer, that they may enjoy the moistness of such seasons most proper for the enticing forth of roots, and most safe from excessive heat or cold.

Mr. *Rea* adds another direction, *viz.* 'That in such Plants as are unapt to root, you bind the

110 *Of Propagation by Circumposition.*

the upper end of the slit very hard with a Pack-threed or Wier, which will stop the sap, and hasten the effect desired. To facilitate this Operation, some commend, and use Layer-pots, which are made on purpose with a hole in the bottom, to let out the water, if there should be too much, and with a slit on one side. The Operator placeth it in the ground by the side of the Gilliflower, and bringeth in one of the choicest slips at the slit, so that the top of it should be above the top of the small layer pot, and the lower part shall be in the pot filled with earth, wherein it strikes his root.

**Num. 4. *Of Propagation by Circumposition.***

Circumposition is a kind of laying ; The difference is, that in this the mould is born up to the bough which is to be taken off : in laying, the bough is to be depressed into the mould. We use this most in Apples after this manner, First disbark the bough a little above the place where it is separated from the main Stock or Arm, so that the Hat, or other Vessel, that holds up the Mould to the Incision, or disbark'd place, may rest upon the stock, then slit an hat, an old boot, or take any strong peice of old course cloath, tying or sowing it so strongly, that it may be able to hold up the mould to the incision ; Some time before you fill this Cap with Mould, remem-

remember with an Awle or point of a pen-knife, to bore two rowes of holes upon the upside of the cut, about half an inch or more, one from another, then fill it with good mould, or such as is agreeable to the tree you work upon, and in the heat of Summer, water it now and then. The time of this operation is not in the Summer, as Mr. P. supposes (which mistake was sufficient cause why he shold not like the Experiment) but in the Spring before the sap rises, particularly in February, or the beginning of March.

Such Plants are propagable this way that might take by laying, but that the branches are too far risen from the ground to be laid along therein; and therefore it becomes necessary, since they cannot stoop to the earth, that the earth should be lifted up to them.

*Num. 5. Of the manner of growth by Circumposition, and whether thence an Argument may be made for the descention of Sap.*

Concerning the manner of growth by Circumposition, I shall only make this remark, whereas it is supposed by some, that the roots are made above the disbarked place, by the descention of the sap, which is supposed to be at the fall of the leaf, I have found experience very contradictory to their supposals; for the leaves fall not till after Michaelmas; and

212 *Of the Saps descent in the Winter.*

and nature proceeds to the germination, and increase of Roots from the Spring all the Summer long, so that nothing can be argued rightly from this operation, or from the effect and product of nature thereupon, for that opinion, which makes the sap to be every Winter reposèd in the Root, as in a large receptacle, and of its descension thither after every Autumne. If it were there as in a Repository, it were a wonder that roots should be dryer in *December*, then in *May*, or *June*, and sensibly more void of juice. And if it did descend after Autumne, how could it ascend at the same time? That it doth then ascend, is plain from this Experiment; Take up a tree, or other vegetable, in the fall of the leaf; the leaves will wither, and the bark begin in a little time to wrinkle; then set it again in a proper soyl, well watered; the effect will be, that the leaves will recover freshness, and the bark wax plump, and the body firm, and full as before, which could not be but by a fresh supply of ascending sap, which might fill up the pores made by the weather, and exhalation of the Sun. I am contented to believe that the sap is in Winter where I see it to be, (viz.) on the body of the tree coagulated, or crust-ed into a new coat, encompassing the whole, which was not extant the year before, and on the top fashioned into new shufts, which visibly appear the product of that matter, the place of which is asserted to be elsewhere, and

and not where upón the most ſedulous inqueſt it cannot be found.



## C H A P. V.

*Of Inſitions.*

Num. 1. *Of Grafting in general, and particularly of Shoulder - grafting, Whip - grafting; Grafting in the cleft and Ablation.*

**G**rafting is an Art of ſo placing the Cyon upon a ſtock, that the Sap may paſſ from the ſtock to the Cyon without Impediment. For the right operation of which, it is a chief remark, that the ſpace which is between the bark and the ſtock, is the great Channell for conveyance and keeping of ſap, ſo that every one that Grafts well ſo orders the manner, that theſe ſpaces be ſo laid, that the paſſage may be eafe, and direſt from the ſpace under the bark of the ſtock, to the ſpace under the bark of the Cyon.

This may be done ſeveral ways.

First by Shoulder-grafting, the operation of which Mr. *Austin* do's well deſcribe thus: Cut off the top of the ſtock in ſome ſmooth

114 *Shoulder-grafting, Whip-grafting.*

streight place, that may answer to the streightness of the graft when set on; then prepare the graft thus, observe which side is straightest at the bottome, or biggest end, so that it may fit the streight part of the graft when set on, then cut one side only of the graft down aslope, about an inch long or little more, and cut through the bark at the top of the cut place; and make it like a shoulder, that it may rest just upon the top of the stock, but cut not this shoulder too deep, (only through the bark, or a little more, and the less the better) but cut the graft thin at the lower end of the cut, so that it may decline in one continued direct smoothnes, without dents, ridges, spaces or winding all along the slope, from one side of the Cyon to the other, otherwise it cannot joyn in all places to the stock. The graft being thus prepar'd, lay the cut part of the graft upon the straight side of the stock, and measure just the length of the cut part or slope of the Graft, and with your knife take off so much of the bark of the stock, (but cut not away the wood of the stock) then lay the cut side of the graft upon the cutside of the stock, and let the shoulder of the graft rest directly upon the top of the stock, so that the cut parts may joyne even and smooth all along: the inside of the bark of the graft being placed upon the inside of the bark of the stock, and so joyne them fast together with some

strong Rushes or Flags, and clay them on every side that no Rain get in.

If the stock be very little, the way of grafting is the same, only excepted, that in this case there must some of the substance of the wood be taken away, that the graft in its slope be not too big for the cut in the stock, in which operation so much there must be taken from the stock, that the inside of the bark of the graft, may answer the inside of the bark of the stock, which being done, all things else are the former way performed. This is call'd Whip-grafting, and is opposed to the former wherein no wood is cut from the stock. For, for Shoulder-grafting it is required that the stock be not over big; for then the bark being taken from it, there will not be a right application of the Sap-channels of the Cyen and Stock mentioned in the definition of Grafting: The disbarked place in great stocks being necessarily much greater then the disbarked or cut place in the Cyen to be fitted to that stock; yet if the stock be not three inches circumference, the Artist may open so little of the stock as to make the graft applicable enough. For he may so slice it up as to open no more of the real wood, then the wood in the bark will reasonably well cover. Which if it cannot be done by one straight cut, yet the bark may be mark't on either side of the graft with the Artists knife, and then dig'd out, or lifted up, and this way will

116 *Shoulder-grafting, Whip-grafting.*

suit with stocks of any bigness if the Gardiner observes this Circumstance, that where the bark is very thick and crusty, there it being first mark't with the Pen-knife, even with the sides of the flat part of the Cyon, and then cut and lifted up on the sides, the end of the label of the bark at the foot of the Cyon be not cut off at all, but tied again upon the Cyon to keep it close to the stock, which otherwise, where the bark is thick, would probably fit loose.

Of the wayes before mentioned, the one is called Shoulder-grafting, because the upper end of the down-right cut in the Cyon is indented or cut with a Shoulder, and so made fit to lean upon the Shoulder of the stock.

The other way is called Whip-grafting by our Artists, because of the dispatch that is in it. For the operation therein, maketh but one straight down-right cut in the Cyon, and the like in the stock, and so tarrieth not to cut Shoulders, Indenters, or Lips, or make any further Operation.

I must not here conceal that there is now come in practice a very useful diversity in this way of Shoulder-grafting, used first as I think by Mr. *Bobart* our Oxford Physick Gardiner. The way is this, The Graft being prepared as for Shoulder-grafting, the Graftor slits or cleaves with his Pen-knife the inward face of the Cyon in the cut part, or at least lifts up the bark on that side on which the Cyon is applied

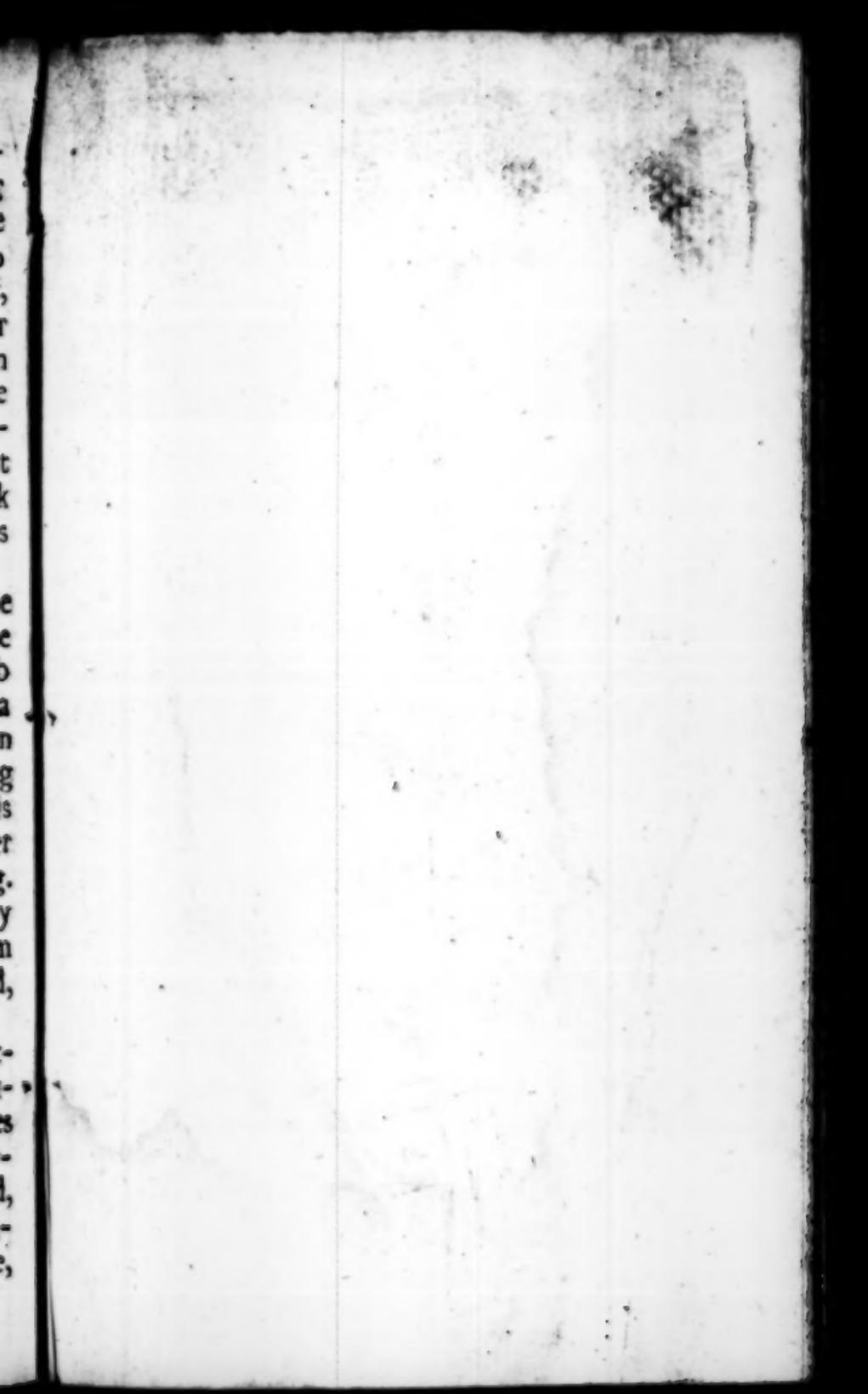
applyed to the stock, so that one lip of the cleft Cyon is bound on the one side of the stock, and the other longer lip on the other side, as in the plainer way of Shoulder-grafting. For the lip of the Cyon is in this operation cleft. And this is surely the best way of grafting in the cleft. For it hath the strength of the other, and the wound caused by the cleft, doth recover sooner in the Cyon then when made in the stock. The Cyon being thus slit, and tyed as it were upon its saddle, with its legs on either side of the stock, sits much more strongly on, and doth much better resist the force of the winds, and other casualties (which these new and weakly cemented conjunctions are subject to) then those which are tied only to one side of the stock are able to do, and to prevent which Casualties, Gardiners that use the Shoulder-grafting have been forc'd to tye up their grafts with Splinters, where the stocks may probably shuit long Cyons, and stand open to the Winds.

The common way of Grafting in the Cleft, hath been of long use, and is generally known to all Gardiners. The stock must be cleft in a smooth place, and even, and the cleft so prepared with your knife in the cleaving that the sides be not ragged. Then both sides of the bigger end of the Cyon are to be cut down slopewise, and at the top of the cut, Shoulders may be made or not made at pleasure.

sure. Mr. *Austin* well adviseth that the outside of the graft be bigger in the wedge, or cut place, then the inside, unless the tree be big: But on the contrary, if the stock be so big as to be apt forcibly to pinch the graft, that then it is convenient to make the inner side of the wedge a very little thicker then the other, that so it may preserve the outside (where the Sap-channel is) from being pinched, so as to make the bark of the Cyon sit loose, and not receive the Sap from the stock into the common channel in such a manner as is necessary for the uniting of them.

Some think this way of Grafting in the Cleft, fit onely for great stocks, but I have often grafted See llings this way that were so very small, that the Cyon was put in like a wedge, and was very even to the stock on each side, neither Stocks nor Cyens being near an inch round, but if small Plants are this way grafted, they must be tied about after the former manner used in Shoulder-grafting. And the wound made by cleaving, is very quickly made up, and cemented by the Balsam of the Sap when a young stock is grafted, whereas in old ones it is quite contrary.

There are also many more wayes of Grafting, for if you consult the Figures of Inoculation, you will find that Cyons of Apples may be pack'd on, the bark being cut according to many of the figures there described, and the stock cut off just above it; as for instance,





## The Exemplification of the Operations by the Figure.

- a* Denotes the ordinary cutting of the Bark for Inoculation.
- bb* The sides of the Bark, lifted up for the putting in of the Shield.
- c* The Shield taken off with the Bud, which lies under the Stalk of the Leaf cut off.
- ln* The Shield put into the Stock to be bound up.
- d* The Bark cut out in an oblong square, according to another usual way of Inoculation.
- g* The Shield cut out for the fitting the disbarked square.
- m* The same Shield put into the Stock.
- f* A variation of the forementioned way, by cutting off the upper part of the oblique square, and binding the lower part down upon the Shield.
- o* The Shield so put in to be bound up.
- e* Another variation by slitting the Bark, that the Bud and Leaf may stand forth at *e*, and the Bark slit be bound down upon the Shield.
- h* A cross cut for Inoculation.
- i* The same cross cut lifted up in this Figure, somewhat too big.
- k* The Shield cut off to be put therein.
- j* The Shield put in.
- go* The cut of the Cyon or Stock for whip-grafting.
- gj* The cut of Cyon and Stock for Shoulder-grafting.
- s* The cut of the Cyons, and slit of the Stock for Grafting in the cleft.
- z* The Stock set for Ablactation or approach.
- x* The Cyon of the Branch for the same operation.
- iz* The Branch that is to be taken off by Circumposition.
- 3* The Branch that bears up the mould to the disbarred place.
- 4* The Branch of a Carnation to be laid.
- 5* The joyn where the slit begins.
- 6* The next joyn where the slit is propped open, with a peice of a Carnation Leaf put in.

Add this to the 119 Page.

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stance, according to the figures mark'd with the Letters (a) (b, b) (d) (e) (f)

Ablactation is the same with Grafting, saving that in that way the Cyon remains on its own stock, and on the stock you graft together. For the stock you graft, being planted by the Tree from which you have your Cyon, you disbark and cut the Cyon, so that the inward part of its bark may answer the like dis-barked place in the stock, so they being bound up together, and not separated till you are sure they are surely incorporated, at which time the Cyon is cut from its own, and lives only by the other Stock.

It is an ordinary imagination that by this way of Ablactation, Heterogeneous conjunctions may be made to prosper, but those that consider that the cause of the impossibility of dissimilar plants, thriving by any way of Insition, is not the difficulty of their first uniting, but the disability of the root and stock to nourish the head with convenient nourishment, will not easily admit such a fancy; Peares upon Apples, and Services; Apples upon Thorns, and the like plants will with ease take, and continue in good growth longer than such time as is required that the Cyon should depend upon the Mother-plant in Ablactation for the fastning of it till cementation be made; But after a perfect conjunction, and that great shufts have sprung out, they (almost constantly, notwithstanding

the great care) will dye, which is an evident ſigne that this way can administer no help, it only providing that nouriſhment be not wanting to the firſt months, and not ſecuring them from the danger of wanting for the future, fit and wholesome Nutriments for their maintenance and growth.

**Num. 2. *What Plants take on different kinds.***

This is a general rule for Grafting, Inoculation, Ablactation, and conjunction by penetration, or any ſuch way of Propagation, that the Cyon, or thing implanted, be of like nature to the ſtock. But to tell what nearneſſ in every kind is enough, is matter of greatest Art; 'Tis known that Plums will not grow upon Cherries, nor Pears upon Apples for many years, though for a while they may proſper.

I find that divers Plants will take by enar- ching or Ablactation, that will not take by Grafting; ſo Grapes, as the early red upon the great Fox-grape; Apricots alſo and Peaches, which being ſecured upon their own ſtocks, will admit implantation unto another alſo, and take unto it, which by grafting I could never bring them to.

The strangest conjunctions that we obſerve to agree, are the Whitethorn with the Pear, Quinces with the Pear, the Pear with the Quinces,

Quinces, the Medlar with the White-thorn, the Apricots with Plums that are of full sap, and sometimes upon hard scurvy Plums, most use the White-Pear-Plums for that purpose; I find not but some other are as good, (*viz.*) the Primordian, Muscle, Violet. And it is true, that all roses cement and continue well upon bryers, as on the sweet-Bryer, Dogrose, I have Cherries that grow upon Plum-stocks, which is Sir *Hugh Plates* experiment from Mr. *Hill*, p. 113. and Currants upon Gooseberries: what duration they may be of, I expect to learn. I am not convinced by experience that Pears upon White-thorn are worse in their fruit, but if so, I shall prefer Apple-kernels before Crabs for a Nursery. I have tasted very excellent Katherine Pears without stone or hardness, that came from a Thorn-stock: nor were they smaller or harder (which Mr. *Taverner* asserts) than ordinary fruit upon the proper stock, however I advise that such as shall for want of Pear, use Thorn-stocks, that they graft very low, for otherwise the Thorn not growing proportionably to the graft, will cause the graft to decay, being never able to grow thereon, unto the bigness usual in Pear-trees.

There are almost infinite stories of strange conjunctions which urge earnestly for credit, some of incisions made upon animal bodies: The Lord of *Pieresh* had a present made him of a Plum-tree branch which bore blossomes and

and leaves, which sprang from a thorn that grew in the breast of a Shepheard, this Shepheard having got this Thorn by falling upon a Plum-tree. Raw silk has grown on the eye brow of a Lady, mentioned by *Borellus, obser.* **10. cent.** 1. being drawn through the fletch, to stich up the lips of a wound there, and the growth was so considerable, that it required frequent cutting. And it is also reported, that there was a *Spaniard* lately that nourish'd a bramble that grew out of his belly. The Improvement that from these, and the like Stories, the Author in the forecited place proposeth, is that with Blistering plaisters the Bodies of divers Beasts be excoriated and planted anew with silk, fine wool, cotton, or the like. When these new Plantations shall have succeeded to any considerable advantage of the Planters, then we also will leave our Vegetable, and apply our selves by these rarer ways of Infition to the Improvement of Animal Bodies.

### Num. 3. Rules for Grafting.

The time of Grafting, possibly is any time of the winter; I have seen Apples grafted in *November*, and at *Christmas*, and yet thrive very well; but the best time is, that which immediately preceeds the spring: If you can, let the Cyons be gathered before the trees shooe their buds, though some will grow now and then,

then, notwithstanding they be sprouted. It is no matter though the stocks are budded; I have at *Easter* grafted above an hundred Apples and Pears together without any fail.

The best way to keep grafts a long time, especially in pretty hot spring weather, is to wrap them all in wet moss, or cover them with earth.

Lute is made with horse-dung, and stiff clay well mix'd together; Mr. *Austin* advises, that in Shoulder-grafting, the Cyon may be put upon the West or South-side of the stock, because if so, those winds which are most dangerous cannot so soon break off the grafts as on the other sides.

If you would have a spreading tree, put in a long Cyon; if a straight tree, put on a short one, or let but one bud thrive.

Good bearing Trees are made from Cyons of the like fruitfulness. Unbind grafts when they have shot great shoots, that the binding eat not into the Tree, strengthen those that are weak, with a stick tied above and below the grafted place, like Splinters to a broken bone, till the cementation be made and confirmed.

If you would have store of any fruit quickly, cut off the head of an old stock, and graft theron.

To Trees that bear great heads, and are of a fast and binding bark, such as Cherry-tree, some hard Apples, and other kinds of great fruit-

fruit-bearing, and other Plants, it is esteemed necessary by some, to put in more grafts than one, least the sap finding not way enough, the tree receive a check and perish by the disappointment of the sap. However this reason may hold, certainly 'tis prudence to put in more Cyons than one in such trees, least that one failing, the stock likewise die, being bark-bound, and not able to put out a germen.

Cyons are best chosen from the fairest, strongest shufts, not from under-shoots or suckers, which will be long ere they bear fruit, which is contrary to the intention of grafting; the prime use of which, I believe rather to be the expediting, than the improvement of fruit.

#### Num. 4. *Of Inoculation.*

Inoculation is performed by taking off that eye, or little bud which contains the beginning of a bud provided for growth in the next spring, and planting it so upon another stock that the sap of the stock may without impediment or interrupt course, pass unto the little eye, or (as I may call it) imperfect or inchoate bough, and serve it for Nutriment: For which operation the Bark must be cut either downright, with a cross cut on the top; the downright cut being about an inch long, and the cross cut only big enough to serve for the easie lifting up the Bark: and then the

sides

sides being lifted up with a Knife or Quil, the Shield is to be put in, and the lips or sides of the Bark before lifted up, are to be bound down upon the shield: Or the cross cut may be in the middle, and then the shield is to be made picked at both ends (otherwise in the forementioned way, the lower end only is made picked) and the four lips are to be lifted up for the letting in the Shield. Others cut the Bark clean out in an oblong square, & cutting the shield exactly in the same dimensions & figure, apply it to the disbarked place in the stock. Others cut their shield in the mentioned figure, but take not off all the Bark answering the oblong square shield, but leave the lower part on the stock, under which they put the lower end of the shield, & bind it down thereon. Other varieties there may be, and are used, some more of which are delineated in the annexed Figures: To take off the Bud clean from the Cyon, the best way is, to draw the lines of your Shield through the Bark with your Knite, and to take off the rest of the Bark thereabouts, leaving only the intended Shield thereon.

Having so far prepared your Bud before you take it off, remember to open the bark of the Stock, for otherwise the shield will take hurt by the Air, which must be placed upon the Stock with all speed, and bound with something that may be of a yielding nature. The best way of taking off Buds, is with a

Quill

Quill which is cut like a scoop, the one half, or two thirds, taken away for about an inch in length at the end: In taking the Bud off, be sure not to leave the Root behind; And for bindings, use any sort of soft Rushes that will hold tying, long slipes of Linnen or Yarn.

I prefer such binding as need not be taken off till I expect the springing of the Bud, for there is much peril in premature loosing the bonds, yet 'tis necessary to unbind whensoever the Stock swells about the place of Inoculation. The time of Inoculating is, from the first time you can get strong Buds that will come off after the frosts are gone in the Spring, till such time as that the Buds then implanted may be fast cemented before Frosts return in the Winter. You may Inoculate with the last years Buds, which are strong commonly, and fit to be put in at Easter.

Other Rules for Inoculation are, That the Cyon from whence you take the Bud be not weak, for then the shield will be so too, and likely bow or double in the putting in, which is a great reason why the double yellow Provence Rose is so hardly propagated by this means; other Roses, as the Rosa Mundi, Velvet, Marble, and Apples, Aprecotes, and the like, very easily; It is also required that the Bud be not sprung out before it be taken off.

If you carry Buds far, expose them not to the Sun, but cut off the leaves, or some part of them, and wrap them up in wet Molsor

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fresh leaves, to keep them cool.

If the Bud take, in the *March* after cut off all that growth above it, stripping away all the Buds that come forth elsewhere, or at the least all save one: some conceive one necessary for the drawing up the sap.

Choose strong Buds for Inoculation, and strong Cyons for grafting, and put them alwayes on a smooth place of the stock.

Any thing may be propagated by Inoculation, unless the slenderness and weakness of the Shield hinder, that can be by grafting. Apples and Pears, though seldom Inoculated, certainly take. I have sometimes used to cut off the shield with a sharp knife flat, with part of the wood thereto adjoyning, and put it in so; But this way, though many take, especially in Apples, yet the ordinary way seems better and more certain. Some take off Shields without a Quill, slipping them off with their fingers; but this is the ready way to leave the root of the Bud behinde on the Cyon, which being wanting, the other part of the Shield is unprofitable.

A pair of Compasses made flat at the ends, and sharp with edges, is an apt Instrument to cut away Bark for Inoculation, both for a true breadth and distance all at once; and so likewise with the same you may take off the bad truly to fit the same place again in the stock, Sir H. P. p. 113.

Num. 5. Kirchers Experiments concerning  
Institutions examined.

Kircher, a Learned man, I may call him the *Play* of his time, after he had reproved the fallacities in *Wecker*, *Alexium*, and *Porta*, who had asserted a change of colours and rare variety of flowers, by steeping those roots in juices whose colours were desired, seems to me as much to be blamed, in that he writes so confidently of things which are so much like Paradoxes, & equally gainsaid by experience.

He says, that he doubts not, but has from experience these effects; That a white Rose, grafted upon a red, will bring that *Rosa-Mundi*, or a Flower both red and white. This I have often prov'd false by mine own tryal; That a Gelsimine grafted on a Broom, will bring yellow flowers like those of the Broom; That I tryed, and could not make to grow, so far it was from bearing any Flowers, *v. Kirchers Ars Magna. p. 13. c. 6.* But that Jasmine upon Jasmine will grow and thrive, my own and others experience can attest.

The same Doctor, in another Book of his, *De Magnete*, where he has many good Experiments about that Stone, yet as to his *Autoparaismos*, either he is out, or there is greater difference betwixt the Country where he tryed his Experiments, and *England*, then can imagine; I have tryed Mulberries on Beech,

Beech, Quinces, Apples, Pears, Elms, Poplars, and by grafting they would not take, yet he affirms they take easily; and more, that Mulberries are by conjunction with white Poplars, made to be of a white kind, and bear white Mulberries; That Pears being grafted on a Mulberry, bring a red coloured Pear, such I suppose as that which we call the Bloody Pear, and that a Peach being Inoculated on it, it sends forth a bloody Peach, are his assertions, which conjunctions I see will not with us take, but if they would, I could promise my self no greater alteration of colour thereby, then I find in the flowers of Roses, which I have tryed in very many different sorts, and experienc'd to follow the Cyon without any participation of colour from the stock.

I having heard the same relation made of changing the colours of Tulips, by Artificial grafting the Bulbs of the white and red, and other colours, by proportionable indentment in each Bulb, tryed it this year in divers Roots, and made the Insitions, and put together the parts as artificially as I could, according to the rules here given; but the event is, that the Bulbs come not up at all, but die upon the operation.

But I do more wonder that the Curiosity of the learned *Gassendus* should not have found out and rejected the vulgar Error, namely, that Plums, and other Fruits, may be made to purge, if the place of the Insition, (viz.)

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where the graff or Cyon is pack't on, be bored, and the juice of *Scammony*, *Colocynthis*, or *Hellebore*, be shut and peg'd in the hole, and that by the same method any sort of fruit may be made Narcotique, perfumed, or indued by a juice proper for the purpose with any sort of qualities. *V. Gassendum Capite de Facultatibus Plantarum.* But I must do him this right, that he mentions these effects, rather from the Reports of others, then from his own Experiments.

**Num. 6. *The manner of growing by Grafts.***

It is prov'd by Experience, that there is every year a new coat of Wood made to every thriving Tree, by apposition of sap hardned into a thin Board (as I may call it) insomuch that I have known divers Woodmen, that would boldly assert the determinate number of years, that any Oke, or other Wood, has thrived in, by the number of those several distin& Rings of Wood that are to be counted from the middle or Center of the Tree, to the outside of it, it being credited, and that I think with reason, that every one of these Rings arose from the apposed and hardned sap of every several year.

Now in grafting upon a firm stock, it comes to pass that the sap of the stock is apposed to the body of the Cyon, and so incloseth the Cyon with the last coat of the whole Tree,

Tree, that there is, as it were, one and the same part of new Wood, that doth closely encompass the whole, both Stock and Cyon, which when hardened, grows to be strong, and of the same use that splinters are to a broken Bone; and Gardiners wisely provide for the strengthening of the compagation of the Cyon and Stock, until this sap be incrusted to a hardness; when the first year of their grafting, they do not only bind up the Cyon to the Stock, but use splinters of old Wood, that neither the winde, or other accidents, may dislocate what with Art is joyned together. This first, for the manner of conjunction and fastning of the Woods: Nor do I make any difference between Grafting and Inoculation, because I am perswaded, that as there is in every Seed an actual Plant, so there is in every Bud an actual Bough, and that a Cyon and a Bud differ but as a greater and lesser branch.

But how the sap of the Stock (suppose a White Thorn) can serve to make the Wood, Bark, Leaves, and fruit of its Cyon, suppose a Pear, is a difficult question: For grant there be an elective attraction of sap from the earth; yet how shall a white Thorn choose that which is fit for a Pear? My thoughts are, that for those who maintain election of similar parts, it were best to suppose a great likeness in all Grafts and Stocks, as to their inward nature and parts, though not outward

figuration; and there being this likeness in the substance, it will not be hard to conclude, that the Cyon, by altering the position of the same ſubſtantial parts, may make to the ſight, ſmell, touch, taste, a thing of another fashion.

For those qualities that affect the ſenses vary often in one and the ſame thing: The Apple in the beginning that is without ſmell, of ſowr taste, green colour, hard to the touch, ſhall in a little ſpace be fragrant to the Nose, ſweet to the Palat, of a golden or ruddy colour, and ſoft to the feeling: And in a thouſand instances 'tis found, that ſeveral poſtures of the ſame parts, ſhall produce ſeveral opposite colours, and other ſenſible appearances in the ſame things: There is no inherent colour, either in the iuſtution of Galls or Vitriol (though limpid they are not) ſo dark or deep, as to come near the blackneſſ of Inck, which notwithstanding, being mixt, they produce. Two other Inſiſtions of like colour, would not upon mixture arise to ſuch an effect, because not able to diſpoſe each others particles into ſuch poſtures. Spirit of Vitriol, though without colour, diſpoſes the parts of this Inck ſo as to deſtroy the blackneſſ; Oyl of Tartar reſtores both poſition of parts, and prifine colour; and that it arises from diſferent poſtures, may be argued, because there is a viſible motion ſtriv-

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ving, and local mutation in them, before these last effects are produced ; and its plain, that when the Inck, by reason of the spirit of Vitriol, disappeared, yet all the parts were there, for else it will not be imaginable how a limpid Liquor, as Oyl of Tartar, should reduce the colours : which it does not by it self generate, as it is plain, because restoring Letters written with Inck, and taken off with Spirit of Vitriol, it makes no blackness on the Paper, save only upon the lines of the Letters : These two limpid Liquors likewise, being put together, turn into a good consistence and milky colour.

But he that desires more instances of this kind and matter, that, according to this Doctrine, may much help the Theory of colours, and particularly the force both of Sulphurous and Volatile, as likewise of Alkalizat and acid salts, and in what particulars Colours likely depend not in their causation from any salt at all, may beg his information from that noble Person, in order to whose command (for all his intimations to me are such) I am now writing, who has some while since honoured me with the sight of his Papers concerning this Subject, containing many excellent Experiments made by his Honour for the elucidation of this Doctrine ; or otherwise, for the present, may see very good instances hereof in Doctor *Willis* his Treatise *De Ferment*, c. II. And truly, if Tastes, Colours, Smells, were

not easily alterable, it would not be that we should from the seed of the same Plant attain to such change and variety of Flowers and Fruits as are mentioned above, nor of Flowers from the same off-set.

But if there be supposed in the world, and all several Bodies, but one Element or material Principle, from which, by Natures undiscryed Wisdom, in appointing it into several motions and changes of situation, and giving different Measures and Figurations to its smallest Particles, there arise all the varieties in the world; then there will be no difficulty, how the same sort of matter should give substance both to the Stock and Graff, though Plants of different nature, and bearing different Boughs, Leaves, Fruits, Seeds, each from other; for if from any matter, any thing may be made without difference, then particularly the wildest stock may afford Elements fit to nourish the boughs of any Plant, of how gentle and noble nature foever.

But lastly, If all these Considerations be too troublesome, I can help a lazy Naturalist to an admirable expedient for the resolving this appearance; let him be content to believe, that when the Sap, gathered in the root, comes to the place of coniuncture, it is there forc'd to undergoe a total corruption, and lapse into the bed of its first matter, from whence, by a new generation, there arises a new sap, begot in the Tree by a specifick faculty, which in

in a Pear-graff may be call'd a *Pear-sap-making power*, and so in all the rest: And for the commendation of this last way of Resolution, I must express this is its excellency, that it is equally appliable to all things in the world, each thing being made (and the cause as easily believed) by some such thing-making power.

Or it might not be amiss to entitle *Diva Colchodea*, the *grand-general form-making-intelligence*, to the production of all these effects, and in Romantick guise, to place her, as it were, in a non-erring chair, sitting in the very place of conjuncture of Cyon and Stock, and working by wayes and arts belonging to her own Trade (and therefore, as her proper mysteries, not to be revealed) to the forming in most occult and admirable manner of the appearing effect.

Num. 7. *The Conclusion of this Discourse concerning the five usual wayes of propagation of Vegetables. Question: Whether besides these five ordinary wayes, there is yet found out any other certain way for the propagation or raising of any of them.*

And now after my rude and plain way, I have given you the History of the five ordinary wayes of Propagation of Vegetables. The first and most according to Nature, being that which is done by seed: The second by Natural Off-sets. The three last, namely the

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Propagation by Stems or Cuttings; by Laying, and by Inſitions, are the more artificial, though Nature gave hints of these also; which by the Industry of the laborious Sons of the firſt Husbandman, and Gardiner (the firſt Man *Adam*) have been at this day thus far improved. What other wayes may hereafter be discovered, and particularly what this inquisitive Age may find belongs rather to the Astrologer then to the Historian, but this I conceive that the conſideration of Vegetable matter ought not to be laid aside as incapable of further Improvement.

As to that question, whether these are all the wayes of Propagation that may be relied on as real, and without Impoſture, or whether there is no way out of the Ashes or Salts, or other Parts or Principles of Vegetable bodies to produce them otherwise then hath been ſpoken. I muſt anſwer with ſome Caution, First that Nature hath private ways of her own to raise divers ſorts of Plants without formed ſeed or off-ſet, or the Artists help in the wayes newly mentioned. So when ſtones are digged out of a deep Quarry, and Wells are walled with them, there groweth from those walls Liverwort, and ſome ſorts of Adiantum, and ſometimes Umbilicus Ve-eris, and Moſs, and other Plants which can- not be ſuppoſed to arife from ſeed. And ſo keſiſe when grounds, after long Tillage, run again to Ferne or Furze, or Heath or Bushes,

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Bushes, or Broom or Thistles, or the like Plants, it frequently happens that the Production of these Plants can hardly be ascribed to the usual wayes of Propagation. And therefore in all these cases, we that know no better, have still recourse to seminal Particles latent in the Earth, even from the Creation. For as I have before discous'd, It is not improbable that God at the first made the Seeds of all things in the first Matter. But our question runs not concerning Propagation purely Natural, but concerning that which is artificial or mixt.

Imperfect Plants possibly may be contented with other easier means. It is experienc'd, that if the water wherein Mushrooms have been steeped or wash'd, be poured forth upon an old hot bed, or if the broken parts of Mushrooms be strowed thereon, that from these parts, as from a seed, there will speedily arise more of Mushrooms; but it may be answered, either that these are imperfect Plants, or this way may be reduced to that which we call'd propagation by Cuttings. The Learned *Kircker* indeed, amongst other his strange Relations, telleth us, that if we take an Herb, and shred it small, or reduce it into Ashes, these Ashes being sowed, there will spring thence herbs of the same Species with those whence Ashes were made: I can't with good manners to so great a Vertuoso, tell my Reader how little I dare believe this, and some

some other of his Reports. For were this true, it were an ill Cuitome of our Gardiners and good Housewives, that mangle great store of their ordinary ashes, all made of incinerated Vegetables, with a little of their Garden-seeds to make them go the further, and prevent too great a thickness in the Plants they sow. It were well indeed, if by such mixture they could have a Grove of Okes from Oke Ashes mixt with their seed sprung up in a field of Turneps, or if from the Ashes of Straw they could have a crop of Corn, it were surely a considerable advantage.

It is unquestionable, that in the Ashes of every Vegetable lyeth the fixed Salt. And this Salt is a very considerable constituent part, and very apt to shuit into form, and to give a consistence or solidity to the body it constitutes. But that the Ashes alone should raise a Plant, is countenanc'd neither by Reason, nor Experience. Sir *Kenelm Digby*, giveth us this Experiment. Calcine, saith he, a good quantity of Nettles, Roots, Stalks, and leaves, and in a word, the whole Plant; make a Lye of the Ashes, and filtre the Lye to separate the Salt from the Earth, set this Lye a freezing until it be congealed, and then in the Ice of this congealed Lye; there will be an appearance of abundance of Nettles frozen in the Ice. Onely they will not be green but white, otherwise they will be as like a Naturall throng of Nettles as if they were Painted.

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As soon as the water melts, all these Ideal shapes will vanish, and when congealed again, will appear afresh. So Sir *Kenelm*, as he giveth us this report in his little peice concerning the Vegetation of Plants.

I had about a year a go a very good opportunity of trying this Experiment ; For being to clear a ground for a Garden that had been long over-run with Nettles, I wanted not a good quantity of the Materials, which having calcined and boyld into a strong Lye, and filtrated it according to Art, the success was thus, as it stands in my Diary for *Jan. 3. 1668.* Upon the first Congelation of the Lye, it was not unpleasant to see the variety of Figures struck, some there were like harps, others like dressing Combs ; In some places there seem'd the appearance of ruin'd Piatza's, and the Coins of large Windows. *Jan. 4.* I made the Lye stronger, and then on the one side, and end of that side, or face of the Ice, there appear'd as it were a Grove of Trees lopt, or Chapterless pillars, and on the other end of the same side of the Ice there seem'd to be a rude draught of nine or ten feathers, well and orderly plum'd. Then we took out the cake of Ice, and turn'd it where there appear'd the in figure of a Battel limn'd, with the Images small : And in some parts, the Salt in the Lye had shot into strait lines, five or six of which together, in divers parts, represented a Fes-  
toon or Truncheon. Of these there were many,

many, In some places they shot cross with interstices of plain Ice, which we could Phancy like nothing more then quarters of Wainscote.

In the next freezing there were scarce any figures struck at all, nor in the next following, for the Lye by some contingency was grown confused and thick. That Lye therefore being afterwards filtrated, yet there appeared no Figures on the outside, but turning the Cake, we found, as it were, little thickeſs of Firre-trees in divers places.

Upon other Congelations afterward, we sometimes thought we saw somewhat like the sorts of Maidenhair, insomuch that at last it became most to our Admiratiſon, that in ſo much Variety as we had ſeen, we could not phancy out one formed Nettle.

Mr. Boyle in his Essay of Unſucceeding Experiments, reckons those of this Nature deſervedly among his contingent ones, where he relates of himself, that having ſet in Snow and Salt a fine green ſolution of good Verdigreafe to freez, (which Verdigreafe containeth much of the Saline part of the Grapes coagulated upon the Copper by them corroded) he obtained an Ice of the ſame colour, wherein appeared diverſe little figures, which were indeed ſo like to Vines, that he was ſomewhat ſurprized at the Experiment. And which increased his wonder, Another part of the ſame ſolution being frozen in another

Vial,

Vial, by the bare cold of the Air, afforded an Ice angularly figured, not at all like that made by the application of Snow and Salt. And finally, having for tryals sake suffered that Ice wherein the Vines appeared to thaw of it self; and having then frozen the liquor a second time in the same Vial, and after the manner as formerly, he did not discern in the second Ice any thing like that which he admired in the first.

It is more highly Magical that Sir *Kenelm* reports concerning a *Polonian* Doctor, who shewed *Quercetan*, Physitian to King *Henry* the Fourth, a dozen Glasses sealed Hermetically, in each of which there was a different Plant, *viz.* a Rose in one, a Tulip in another, a Gilliflower in a third, and so in the rest. When these Glasses were offered to the first view, there was nothing in them but a heap of Ashes in the bottome to be seen. But as soon as he had held a gentle heat under any of them, presently there arose out of the Ashes the Idea of a flower, (*viz.*) the flower and the stalk of that Plant of which those Ashes were made: And it would shuit up, and spread it self abroad to the just height and dimensions of such a flower, and had a colour and shape answerable. But when ever the heat was drawn from it, as the Glass, and the enclosed Air, and the Matter grew cold, so would the flower sink by little and little, till at length it buried it self in the Ashes. And this it

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it would do as often as you exposed it to Moderate heat, and withdrew it thence; and *Kirker*, as Sir *Kenelm* reports, told him that he also had been an Eye witness of this Experiment.

But however, this is but a way to raise the Idea of a Plant, and not the Plant it self: And if any such way there be, It is yet held in Rosy-crucian darkness. And therefore we that are not raised above the vulgar Physiology, are willing to think that what in these cases appear'd, was neither Plant, nor the Idea of a Plant, but only the Phansy of such Idea.

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C H A P.

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## CHAP. VI.

*A Transition leading to a consideration of the wayes of Improvement of Plants raised to Humane use. Of Setting or Transplanting, the Seasons and other Circumstances to be observ'd in these Operations.*

**H**aving now finished our Discourse concerning the Wayes that Nature and Art hath taught us to produce Vegetables, as the next Care is in the Planter, so our next consideration must be how he doth preserve them, and contrive them, that they may continue, and be improv'd to human use. We must learn what hath been found out. First as to Transplantation, then to succor them being Transplanted from all Accidents,

*Nec minor est virtus quam querere parta iheri,  
Nor is't less skill or praise,  
Thus to preserve, then 'twas to raise.*

And

144 *Ways and Seasons of setting Plants.*

And lastly, to meliorate and Improve: But whatsoever the Art is, I shall not be niggardly in giving you the Rules, which as far as I can remember are these.

First all Trees and Shrubs of woody substance, that have Bodies able to endure the cold, are best Transplanted before the Winter, as soon as the leaves begin to fall by reason of the approach of the Hibernal Cold. It is lately experienced, that a quickset of White-thorn, or any other sorts, Apple-trees, or other Orchard Trees, being Planted before the Winter, far outgrow others of the same kinds that are Planted in the Spring. Nay, even Artichokes, and Asparagus, that are tender Plants, and unable to endure great Colds, yet do exceeding well, being Planted at this Season, if they be set in a rich warm Mould, and well defended in the ensuing Winter from the violence of the Frosts.

Artichokes are with us commonly set at above an Ell distance, and thereby in the Winter a trench being made between the Rows, the Mould is usually cast up on Rudes over the Rows for the defence of the Roots, together with a good quantity of green Horse-dung mixed with the mould which doth both serve to enrich the ground, and to keep the Plants warm. And if the Artichokes are not so ranck as to cover the space between the Rows, then in the Summer, Coleflowers, or other Garden-stuff, is commonly set in the Distances.

Distances. For Herbs, and choice Plants, especially those that are set without Roots, it is most fit and usual that they be set in the Spring, as Hysope, Time, Savory, Marjerome, Wall-flowers, Pincks, Gilly-flowers, and Carnations, with this Caution; That by how much more tender each Plant is, in regard of cold, the later it requires to be set, and in the warmer place.

For all Bulbous and Tuberous rooted Plants, it is accounted the best way for their preservation and improvement, that they be taken up every year out of the ground. The Universal and Catholick order of all Bulbous Plants, says *Laurembergius*, is, that about St. James tide, they be taken out of the ground, and put in a place cold and dry, of a free air, not in the Sun, nor covered with Sand or Earth, or accessible to Mice; let them abide so a Month, or thereabouts, then set them again, when they are taken up, cut off the Fibres that grow from under the head: nor need any thus take them up every year (unless it be for the transplantation of the off-sets) by which forbearance, the stock of Tulips is very much increased. *Ferrarius* more particularly forbids the abiding of Anemones in the Earth all the Summer, as being found prejudicial to them by his experience. But Fritillaries, and Peonies, and the Crown Imperial, he will not have removed from their Beds, unless into a Cellar, in a pot of Earth.

Nor are all taken up at the same time, as he seems to intimate; for Narcisses and Crocuses are commonly taken up first, generally when the flower is gone, the stalk and leaf withered, and the leaf full, it is the best season to take them up; some keep them out of the ground longer then is above noted, as till Christmass, or after; as this year, being in **London**, my best Tulips, Anemones, and Ranunculus's, were in the House till the beginning of **February**, and yet did well enough: But commonly we re-plant them about Michaelmas, or there abouts: some great Florists keep them out of the ground no longer than till they grow dry; some re-plant them in **June**, some in **July** or **August**; some take not up their Ranunculus Roots at all. Those Gardiners, whose Beds are apt to be overflowed or soaked with cold water in the Winter, (as divers Gardens about **Westminster** are) the later they set, I believe their Bulbous and Tuberous Roots will prove the better.

We here generally remove Fritellaries, Colchium, or the Meadow-Saffrons, all sorts of good Crocus's; Tulips, the bulbous flowers delis, the Gladioli, or Corn-flags, the Ornithogalum, or Star of **Bethlem**; and all Anemones, and the sorts of Radix Cava, and generally all Plants that loose their fibres, as soon as the stalk is dry, are bettered by taking up; and therefore we may add to the former the Lemoia Bulbosa, and Aconitum Hiemale, and

and some other Plants as capable of this Husbandry, though the hardiness of these Plants may excuse the Gardiner from his pains. Besides the Peonies, and Crowns Imperial, mentioned by *Ferrarius*, divers sorts of *Narcissus*'s, and of the *Pseudonarcissi*, the Martagons, the Hiacints, and the Ciclamen's, and all others that hold their fibres, will not endure long out of the ground, and therefore the off-sets being taken off are quickly to be re-planted.

Num. 1. *How the Gardiner contriveth the setting of his Plants, and furnishing of his Garden, so as to preserve a continued Beauty in his Garden for every Month in the Year.*

It is not the least Glory of a Garden of Pleasure to be stored with variety of flowers, as to present somewhat of Beauty for every Month in the year. To obtain this, the readiest and most natural way is, to make a collection of such Flowers as will be in actual Flowring of their own Nature every Month in the Year: For there are some flowers as natural to December, as others are to May, or June, or July.

In January, if the Frosts be not extream, you may have flowers of these Plants, The Christmas flower, or the *Helleborus Niger* verus, Winter Wolves-bane, or *Aconitum*

Hyemale, Hepatica, or Noble Liver-wort  
blew and red, and of Shrubs Laurus Tinus,  
or wild Bay-tree, and Mesereon, or the dwarf  
Bay.

In *February* Hepatica's, as also divers sorts  
of Crocus or Saffron flowers will appear,  
the little early Summer Fool, or Leucoium  
bulbosum, and towards the latter end there-  
of the Vernal Colchicum, the Dogs-tooth  
Violet, or Dens Caninus, and some Anemo-  
nes both single and double, which in some  
places will flower all the Winter long.

In *March* more varieties; for besides that it  
holdeth some of the flowers of the former  
Month, it will yield you both the double  
blew Hepatica, and the white, and the blush  
single: then also you shall have divers other  
sorts of Crocus or Saffron flowers, double  
yellow Daffodills, Oriental Jacinths, and o-  
thers, the Crown Imperial, divers sorts of  
early Tulipas, some sorts of *French* Cowslips,  
both tawny, murry, yellow, and blush, the  
early Fritillaria or checkerd Daffodil, and  
some other sorts of early Daffodils, and many  
sorts of Anemones.

In *April* you may behold all sorts of Auri-  
cula Ursi, or Bears-ears, many sorts of An-  
emones, both single and double, both the sorts  
of Tulipas, the earlier until the middle of the  
Month, and the later then beginning; which  
are of divers colours, that is to say, white, red,  
black, and yellow: Frittillaries, the Muscar,

or Musk-grape flower, both ash-colour and yellow. Divers other sorts of Jacinths and Daffodils, both single and double, the smaller sorts of flower-deluces, the Velvet flower-deluce, and double Honey-suckles, with divers others.

In *May* are to be seen flowring Tulipas (at the beginning) at the end the later sort: some kinds of Daffodils, the Day Lillies, the great white Star-flower, the Flower-deluce of *Constantinople*, or the morning Sable flower, the other sorts of Flower-deluces; single and double white Crow-foot, and single and double red Crow-foot, the glory of a Garden: the early red Martagon, the Persian Lilly, the yellow Martagon, the Gladiolus or Corn-flagge, both white, red, and blush: the double yellow Rose, and some other Roses.

In *June* do flower the white and blush Martagon, the Martagon Imperial, the Mountain Lillies, and other sorts of white and red Lillies, the bulbous Flower-deluces of many sorts, the red flower'd Ladies-bower, the single and double purple flower'd Ladies-bower, the white Springa, or Pipe-tree, for the blew Pipe-tree flowereth earlier, the white and yellow Jasmin.

In *July* some of the Ladies-bower and Jasmines, and besides doth glory in the female, Balsame-Apple, the Indian Cresses, or yellow Larks-spurs, the Purple Flower-gentle, and the Rose-Bay.

In *August* begin some of the Autumnne bulbous flowers to appear, as the white and purple Colchicum or Meadow Saffron, the Purple Mountain Crocus, or Saffron flower, the little Autumn Leucoium, and Autumnne Jancinth, the Italian Starwort, called of some the Purple Marigold, the Mervaile of Peru, or of the world, the flower of the Sun, the great blew Bell-flower, the great double French-Marigold.

In *September* flourisheth the flower of the Sun, the Mervaile of the World, the Purple-Marigold, and blew Bell-flower spoken of before, and likewise the other sorts of Meadow Saffron, and the double kind likewise, the Silver Crocus, the Autumn yellow Daffodil, Cyclamen also or Sowbread shew their flowers in the end of this month.

*October* also will shew the flowers of Cyclamen, and some of the meadow Saffrons.

In *November*, as also sometimes in the month before, the party coloured Meadow Saffron may be seen, that will longest hold his flower, because it is the latest that sheweth it self, and the Ash coloured mountain Crocus.

*December* also will not want the true black Hellebore or Christmas flower, and the glorious shew of the Laurus Tinus, or wilde Bay-tree.

I have continued this note of the time of Flowring, though in some particulars differing from the times assign'd for flowring, both

in Mr. *Rea*, & Mr. *Evelings* *Kalendarium hortense*, for generally I see no reason to alter it: Mr. *Evelings* are indeed more full, his design being to extend his observation to all kind of flowering Plants, Mr. *Parkinson* his only to those that are for Ornament, esteemed of in a Flower Garden: such who desire further satisfaction, and a more comprehensive knowledge in this particular, may have recourse either to the excellent *Kalender* of Mr. *Eveling*, or to the writings of the experienc'd Mr. *Rea*.

Some I confess there are that value not much a Winter Garden, nor care that their flowers should come too early in the Spring, because they dare not venture into their Gardens to take the pleasure of them before the weather be grown warmer. It is adviseable therefore for them to set the motions of Nature a little backwards, and not to replant their Anemones, Tulips, or other Plants that loose their Fibres, and so will endure out of the grounds too soon.

The ordinary time to Plant Anemones, saith Mr. *Parkinson*, is most commonly in *August*, which will bear Flowers, some peradventure before Winter, but usually in *February*, *March*, and *April*, few or none abiding until *May*: But if you will keep some Roots out of the ground un-planted till *Febr. March*, and *April*, and Plant some at one time, and some at another, you shall have them bear Flowers according to their Planting; those that are plan-

152 *To retard Anemones and other Plants.*

ted in Febr. will flower about the middle, or end of *May*, and so the rest accordingly, and thus you have the pleasure of these Plants out of their Seasons, which is not permitted to be enjoyed by any other that I know, Nature not being so prone to be furthered by Art in other things as in this, yet regard is to be had, that in keeping your Anemones out of the ground for this purpose, you neither keep them too dry nor too moist, for sprouting or rotting; and in planting them, you set them not in too open a Sunny place, but where they may be somewhat shadowed.

The soyl is also to be considered wherein Tulips, Anemones, and these Bulbous and Tuberous roots are planted: A mixture of Sand and Cow-dung, rotted together for many years, is with us generally used, and fresh earth must alwayes be added to the bed when the roots are replanted. *Experimento d dicimus*, saith *Ferrarius*, lib. 3. cap. 7. *in eâ famosâ terrâ, quæ superiore anno in Anemonarum aliturâ servidioris pinguedinis uber nonnihil emunxerit, Tulipas mirifice adolescere ac magnifice efflorescere. Quis & amenissimi flores bi maxime letantur alunturque ad amenitatem insolitam eo terre flore ac polline quem è declivo loco delabens aqua delibat ac devolutum in imò sitit.* We have learn't by Experience, saith he, that Tulips do wonderfully flourish and improve in that mould which the year before hath lost a little of its strength and fatness, by nourishing a bed of Anemones,

as also in that fine earth which is carried down from some steep place, by a Land-flood: But we shall speak more of this hereafter, when we shall speak of Melioration, and Improvement by the different Minera of the soyle.

Num. 2. *Of the setting of Woods, Fruit-trees, and Plants uncultivated.*

Concerning Plants that are ordinarily set abroad, and are not cultivated in Gardens or Orchards, few observations can be made that are not very vulgar; It is greatly his interest that minds the thriving of his Trees, that they be set that the Roots may run just under the Turf, in the surface of the Earth, the higher the better, if they are kept moist at the root with wet straw, or the like, and defended from injuries the first year. I have seen some Plants so buried in a depth of thick clay or gravel, that they could not shoot for many years a sprig of a Span long, whereas others set orderly in the same place, did thrive abundantly: And those that think to amend the matter by digging a hole a yard deep, or more, and putting in the Tree with a little good earth, do but cheat themselves; for the Tree would thrive as well upon a Stone-wall, that is washed with rain Water, as in that hole, when once the Root is come to the sides thereof: This I speak generally, and not of such

such particular Trees as delight in a singular minera of Earth.

Young and small Plants that are set in a light Earth must be trod in, and close down to the Roots, least the frost so rarifie the ground as to throw them up again out of the Earth.

And for Orchards, it is a very necessary requisite, that the Roots of Fruit-trees stand above the Gravel, Clay, or Rock, if any such be, provision for which I have known made two wayes, the usual and most common is, to Plant with such Standards which have no down-right Roots, which may be gotten in any well ordered Nurseries, for in such, the Seedling Plants are taken up the second year, and the down-right roots being cut off short, they are set in beds for grafting, and by this means shoot their Root rather in compass, then directly downwards. The second way is a more unusual experiment, (*viz.*) To set the Fruit-tree on the top of the ground, without any hole dig'd, and to lay a load of such dirt as is found in streets to the root, upon the Turf; yet so, that the rain may abide, and not by reason of the banck, run from the root of the new set Fruit-tree.

There is a pretty way of Bancking Trees that serveth as well for nourishment as Fence, set down by Mr. *Eveling*, *Pomona. cap. 7.* Set, saith he, your Tree on the green swarth, or five or six inches under it, if the ground be heathy,

heathy, if moist, and weeping half above it, then cut a trench round the tree two foot or more from it: then lay several rancks of turfs upon the inner side of the trench toward the Plant, leaning towards the tree after the manner of a Piramide, fill up the space within the turfs, with turfs cut out of the trench; so raise up the bank near a yard high, at the point it need not be above 2 foot or 18 inches Diameter, where you may leave your earth in the form of a dish to retain the earth, and upon the top prick some small Bryars for an additional defence. I have known in a dry year when Plants thus planted grew and shot well, when others planted the ordinary way, all perished with the dryness of the weather.

For Wall-trees, it is convenient the Roots be set at such a distance from the foundation of the Walls, that they may have room in the Earth for their roots; a foot is a convenient space generally, for then the heads will without difficulty be drawn to the Wall, and the Roots not be prejudiced.

Those Wall-fruits that are set abroad, as Vines, &c. being kept short in their Branches, and not suffered to climb, become good bearers, especially if they are set near the reflection of the Gravel-walks, or upon other ground kept bare from Weeds.

Divers persons are very nice in the placing any tree in the same respect to Heaven, I mean to the Sun and Winds, that after the removal  
of

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of it to another place, it may have the same situation it first grew in. This rule Sir ~~Kemba~~ *Digby* approves of, and gives this reason of its necessity. There is (says he) a constant perpetual course of Atomes drawn by the Sun from the Poles to the Æquator, and such things as lye in their channel, must necessarily be affected with their continually repeated strokes; and that side of them which is exposed to their immediate blows, ~~must~~ be most sensible of them, on the other side, the Sun with his warm and moist regiment of Atomes will work contrariwise, one side of the Plant will be close, hard, and heavy, and be rather acute then perfectly round, the other will be spungy, tender, light, and dilated, having its figure enlarged beyond roundness, so that (says he) if you expose the tender mellow South-side of the Tree, to the sharp hard wedges of the Northern Air, they will so cleave and batter it, that in a short time it will exhale its spirits and die. The truth is, That if the Phenomenon were true, that those that kept Nurseries, and Transplant 5000 in a year without any observation of the North or South, did find their Trees die thereupon, I should think the cause satisfactorily explained. But they finding no such effect (perchance because their grounds are under the wind) I must leave every body to their liberty to observe or neglect this Rule.

For the Planting of Woods in general, for increase

increase of under Wood, Mr. Blith's way is generally approved, to cast up double Ditches, and Plant any sorts of Wood in the form of a Quick-set : Some sow seeds on the Banks in orderly rows, and set likewise on the top, as well as both sides of the Bank. The time is as soon as the Leaf is fallen, in any Weather or Season. The Plants in a more sound ground, are Ash, Oak, Elm, Sycamore, Maples, Crabs, Thorns ; in a more moist Ground, as a drained Bog, Poplar, Willow, Sallow, Osier, which grow by Truncheons. In which watery soils, the way of raising Ditches is most necessary : For neither Willow, Sallow, Osier, nor any other Plant, will grow in a Bog, without soundness of ground. What Plants grow by cuttings, what by laying for the more ready thickning of Woods, may be seen above in the proper Chapter.

There is a story freely defended and frequently, both in discourses Printed and spoken, that the chips of Elm, being sowed, will grow ; but this is somewhat like Kirchers experiments before mentioned, and not a whit more true ; otherwise, to sow those Chips, would be a good profitable and frugal way for thickning Woods. The cause of the Country-mans mistake (for I suppose not that this error arose from Philosophers) I imagine to be this : At the felling of great Elms many chips must needs be scattered, and lie round about the Tree, and be covered in the Grass there-

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thereabouts ; now the next year, after the fall, there arise generally great numbers of Suckers from the roots of the old Tree, which roots must emit all the sap they gather up into these Suckers, the great Trunck being removed. And these Suckers are easily mistaken to arise from the chips, because they always come upon the felling of Elmes where chips are found, and grow at such distance as chips are ordinarily scattered.

### Num. 3. Whether any Vegetables may be set so as to grow in the Air.

There is a question now-adays frequently proposed, Whether there be more Soils then the ordinary Turf or surface of the Earth, tempered with some water, soyl being meant for the ground, in which things may be set to grow. I need not speak much upon it, as to Water, which by Experiments related in the Chapter concerning Propagation by cuttings, appears to have a property to elicit Roots, and make them where they were not, and nourish the Plants by them after they were made; to which I must adde this circumstance, not before mentioned, that Periwinckle, and divers others, continued their growth by this nourishment alone, from year to year, not dying in the Winter : How long they might have continued, I can't assert, for being absent this Winter, and no fires being kept near;

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The water in the Glasses, was so rarified by the Frost, that the sides could not contain it, but were forced asunder thereby, and so the Plants perished ; whereas otherwise, they being set in a Room over my laboratory, I question not, had many of them continued till now.

Some put forward, that the Air might have the faculty of nourishing Vegetables ascribed to it : And no wonder when *Paracelsus* makes it a sufficient nourishment for men, and brings instances for the proof of his assertion. But I find, that Onions, Tulips, and all Bulbous Roots, though they shoot out a green leaf, yet do very much lessen in their weight. And it appears, that this growth is but the motion of the same parts, or some few of them, to settle and gather in another place, and another order or situation in relation to each other ; for the Onion particularly hath the thicker coverings of the Bulb very much stretched out, and each covering, as it increaseth in length and breadth, by rising into a leaf, so the thickness, which was considerable while it covered the Bulb only, decreaseth proportionably, and is fashioned into a thinner, and more largely extended Vestment.

I have hung up divers *Sedums*, *Orpines*, *Thymalls*, and other such Plants, which I imagined most likely to grow by the Air onely, and to encrease and be augmented thereby, and found, that by all my endeavours, though

the

the Plant grew well, yet they alwayes lost weight, and never got the fourth part of a grain.

Aloes likewise, though being hang'd up in the Air within cloath dipped in Sallat Oyl, it sends forth for many years new leaves, yet it alwayes grows less, and less in weight, till at last the oldest leaves falling off, and new coming up, it grows to nothing.

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## C H A P. VII.

*Of the means for the Improvement and best culture of Corn, Grass, and other Vegetables belonging to Husbandry; and of the ways for removing the several annoyances that usually hinder such advantage.*

Num. 1. *Of the Annoyances to Land, and the Impediments that usually distemper it, to the disadvantage of the Husbandman.*

**T**He Impediments that with us hinder the Husbandmen from making the greatest advantage of their ground, are either the distempers of the ground it self, or some evil accidents that occasionally happen thereto, or to the Vegetables growing thereon. The distempers are generally caused, either by the abounding of water above all other Principles, which causes coldness, and a Dropsical disposition in the Earth; or by the abounding of a dry Earth or Mineral,

and the want of moisture and saltiness, and that Spirit which should cause that motion in the insensible particles of the Earth, which is proper for the exciting the Seeds of all things, and so stirring the ground, that the several particles may be at liberty to enter the Bodies of Vegetables fit for them. The accidents that are occasional come by blasting Winds, rapacious Fowls, Vermine, and Weeds, Fearn, Heath, Broom, and other unprofitable Vegetables; Of these, and the usual remedies against them, somewhat, and the best that at the present occurs, I shall speak in this Chapter.

Num. 2. *Of the Remedies proper to cure the excessive coldness and moisture in Lands, and the ways of Improvement thereby, in Grounds subject to these distempers, by dreining, Pigeons and Poultry dung, Urine, Soot, Ashes, Horse and Sheep-dung: of Ground cold and dry, and how these Soyls may be applicable thereto.*

Bogginess and Obstruction of Springs more or less, is generally the cause of the chill or coldness that lies upon Lands, and breeds the Rush and other incommodities, and therefore the foundation of the cure, and improvement thereby, must be to remove this internal cause, by laying the ground dry, and dreining the Bog: In the relation of which operation, and many more of this Chapter, I shall ease my self,

self, by giving you Mr. Bliths observations and directions thereabouts, who was both a Practiser himself, and questionless a very faithfull and true Reporter of his experience.

In cold, rushy land, says he, the moisture, or cold hungry water, is found between the first and second swarth of the Land; and then oft-times you come immediately unto a little Gravel, or Stonyness, in which this water is, and sometimes below this, is an hungry Gravel, and many times this Gravel or Stonyness lieth lower: But in Boggy Land it usually lieth deeper then in rushy; but to the bottom, where the spewing Spring lyeth, you must go, and one spades depth, or graft beneath, how deep soever it be, if you will drain the Land to purpose.

And for the matter or Bog-maker, That is most easily discovered, for sometimes it lieth within two foot of the top of the ground, and sometimes, and very usually within three or four foot. Yet some lie far deeper, six, eight, or nine foot, and all these are feazable to be wrought, and the Bog to be discovered; but until thou come past the black Earth, or Turf, which usually is two or three foot thick, unto another sort of Earth, and sometimes unto old wood and Trees, (I mean the proportion and form thereof, but the nature is turned as soft and tender as the Earth it self) which have lain there no man knows how long; and then to a white Earth many

times, like Lime, which the Tanner and white Tawer takes out of their Lime-pits, and then to a Gravel or Sand where the water lieth, and then one Spades depth clearly under this, which is indeed nothing else but a Spring, that would fain burst forth at some certaine place, which if it did clearly break out, and run quick and lively, as other Springs do, your Bog would die, but being held down by the power and weight of the Earth, that opposeth the Spring, which boils and works up into the Earth, as it were, blows it up, and filleth the earth with wind, as I may call it, and makes it swell and rise like a Puff-Ball, as seldom or never you shall find any Bog, but it lyeth higher, and rising from the adjacent Land to it, so that I believe, could you possibly light of the very place where the Spring naturally lyeth, you need but open that very place to your Quick-spring, and give it a clear vent, and certainly your Bog would decay; by reason whereof, it hath so corrupted and swoln the Earth, as a Dropie doth Mans Body; for if you observe the mould, it is very light and hollow, and three foot square thereof, is not above the weight of one solid foot of natural Earth, Clay, or Land, whereby I conceive, that how much soever this mould is forced from the natural weight or hardness of solid Earth or Clay, so much it is corrupted, swoln, or increased and blown up, and so much it must be taken down, or let forth,

forth, before ever it be reduced ; I therefore prescribe this direction : Go to the bottome of the Bog, and there make a Trench in the sound ground, or else in some old Ditch, so low as you verily conceive your self assuredly under the level of the Spring or spewing water, and then carry up your Trench into your Bog straight through the middle of it, one foot under the Spring or spewing water, upon your level, unless it rise higher ; as many times the Water or Spring riseth, as the Land riseth, and sometimes lyeth very level unto the head of the Bog, unto which you must carry your Drain, or within two or three yards of the very head of it, and then strike another Trench overthwart the very head both ways, from that middle Trench, as far as your Bog goeth, all along to the very end of it, still continuing one foot at least under the same, and possibly this may work a strange change in the ground of it self, without any more Trenching.

Or thus you may work it somewhat a more certain way, but more chargeable, (viz.) after you have brought a Trench to the bottom of the Bog, then cut a good substantial Trench about the Bog, I mean, according to the form of your Bog, whether round, square, or long, or three or four yards within your Boggy ground ; for so far, I do verily believe, it will drain that which you leave without your Trench, at the depth aforesaid, that is underneath

neath the Spring-water round; And when you have so done, make one work or two just overthwart it, upwards and downwards, all under the matter of the Bog, as is aforesaid, and in one years patience, through Gods blessing, expect your desired Issue: And if it be in such a place as will occasion great danger to your Cattle; then having wrought your works and drains as aforesaid, all upon straight lines (by all means prevent as many Angles, Crooks and Turnings, as is possible, for those will occasion but stoppages of the Water, and filling up of Trenches, and loss of ground, and much more trouble then otherwise.) Then you must take good green Faggots, Willow, Alder, Elm, or Thorn, and lay in the bottom of your Works, then take your Turf you took up in the top of your Trench, and plant them thereupon with the Soard downward, and then fill up your works level again, until you come to the bottom or neither end of your work, where your Trench is so shallow, that it will not endanger your Cattle; or rather take great pibble Stones, or Flint Stones, and so fill up the bottom of your Trench, about fifteen Inches high, and take your Turf, and Plant it as aforesaid, being cut very fit for your Trench, that it may lie close as it is laid down; and then having covered it all over with Earth, and made it even as the other ground, wait and expect a wonderful effect, through the blessing of God;

God; but if you may, without eminent danger, leave your works open, that is most certain of all.

For other sorts of cold land that are sound, and not spongy, or Dropsical, the wayes to make them useful to the Husbandman or Grazier, is to meliorate them by adding to the cold and moist some store of the more hot and active Principles, such as abound in those bodies that are reckoned to have much spirit or volatile salt in them: such as are Hendifung, Pidgeons-dung, Soot, and the like, to which Malt-dust may be added, but is then most useful when impregnated with these Dungs. For there is some of the spirit of the fermented Barly in the Malt-dust, with which the Earth is dispos'd to such a fermentation as is proper to make it fruitful in the production of Vegetables. Yet that spirit is so subtle, that in a dry time it soon exhales, and therefore in a dry year worketh not so great an Improvement as in a wet one: For this Malt-dust our Husbandmen give twelve pence the Bushel, which they generally, where they have the conveniency, spread in a Dove-house (else in a Hen-house well stored) that the Pidgeons may pick it, and further enliven it with their heat and vertue of their dung before they sow it: For all these powerful Medicines are to be bestowed in small quantities, and therefore sowed by the hand, for fear of burning the chits, and killing the corn

in its first Germination. I have observed that where these Dungs have been over plentifully laid, that the place bare no Corn at all, whereas in the same place where it is moderately strewed, there was a vast improvement of the Crop. Urine is esteemed a great help to cold Land from the same principle, and therefore the same Caution is to be used that the parts of it be disseminated, and not laid too thick. I have seen half the Trees in a Codling hedge killed by watering them too much with Urine.

And the Improvement is full as great in cold and moist Pastures and Meadows as on plowed Lands, both by Malt dust and the mentioned dungs. I have seen an Experiment made of divers of these together on several parts of the same ground, where it appeared that the Improvement was greatest by Soot; the second place had Pidgeons dung.

After those above mentioned, Horse dung hath a place by reason of its heat, but if not rotten, and laid too thick, may do harm also; but that rather by an actual, then by a virtual heat, or the power of single principles, as in the former instances. This is sure, that if it be laid on so thick and green as to heat, it will burn the roots of any ordinary Vegetables that grow near it. Sheep-dung, Hog-dung likewise, and all Soyl and Litters of Cattle, by reason of their Dung, Urine, and the heat of their Bodies, lying thereon, have a warmth

in them, and are fit for cold Lands on that account ; and by reason of their moisture, for dry Lands also. For it is to be observed, that many Grounds are dry and cold too, in all parts of the North and North-west, and in *England* many of our Wood-lands especially ; and so all hot and moist soils are most proper for them. Burning and beaking is in many places very successfully used to this effect ; The actual fire heating the ground, and the ashes of Fern, Brake, Heath, &c. of like nature, yielding a Salt very profitable for, and expedient to joyn with the other Principles in the ground, to cause a fermentation and fruitfulness. Of this Operation thus *Virg. Geo.* I.

*Saepè etiam steriles incendere profuit agros,*  
*Atq; levem stipulam crepitantibus urere flammis:*  
*Sive inde occultas vires & pabula terre*  
*Pinguia concipiunt; sive illis omne per Ignem*  
*Excoquitur Vitium, atq; exudat inutilis Humor:*  
*Seu plures calor ille vias & cæca relaxat*  
*Spiramenta, novas veniat qua succus in Herbas.*

*From burning sterl plains oft plenty comes,*  
*Whil'st the dry stubble cracking fire consumes:*  
*Whether this Heat from th' Earths recruited*

*(Veins*

*All vicious and superfluous Moyture dreins,*  
*Or 't may be, secret passages doth ope,*  
*To let in sap, to feed the tender Crop.*

It is a general rule, that there is nothing in animal Bodies, but will turn to excellent Manure: Their Horns, Bones, Hair, Flesh, both of Beasts, Fish, and Fowl, are very rich; and those that know the vertue of them, buy at Cities for the purpose, rags which are made of Wool, Sheep-trotters, stinking Fish, or other Offal of Animals, which must either be mixed with other dung, or not laid over thick.

But it is to be observed, That where moisture is rather required then heat, there floating by Land-Floods, the dirt and mud of Ponds and High-ways is most proper: where warmth and heat is a greater need; there soyl that is made by a mixture of the Offal of Animals, will be more to the purpose, and advantage of the Husbandman.

Lastly, 'Tis probable that any thing that has active parts in it, if it be not just of the nature of the ground, will raise improvement: Heterogeneous things upon their meeting, ordinarily causing that stir, which is thought by most Naturalists now, to have great influence upon Vegetation.

**Num. 3. The wayes of Improvement of dry, light, sandy, gravelly, flinty Lands, by floating, Marl, Chalk, Lime, and Salt-Peter, S. K. Digby's experiments of its advantage.**

Dryness is generally a great cause of barrenness, and is an usual annoyance in Sandy and Gravelly

Gravelly grounds, more especially, in regard that they retain not the rain-water so well as clay, or Land of a mixt soil: The proper remedy for this defect, is artificial watering, which tempers the ground most properly for the improvement of the growth of the most useful Plants, Grain and Grass: For first, water in its own nature and property is a soyl, and has an exceeding agreeableness with the bodies of most Vegetables, as appears by the experiments of their growth in water onely. And secondly, there is a very considerable accruement to dry, sandy, and gravelly Earth, by the fatty soyl and wash that is carried both in Land-floods, and other Water, that having passed through Cities, Roads, or other places of like nature, are drawn over the ground, for the salt oyly parts, and other the mixt earth, that was carried in the Flood, is left generally behind upon the Land; and the salt diluted in the Water, easily enters the Turf, and carries with it other Particles thither, where, by the heat of the Sun, (they being in conjunction with the Sand, Gravel, or other Bodies Heterogeneous, and unlike to themselves) they cause by their mutual fermentation, as is supposed, or some other way, that temper of gound which is most fit for the growth of all Grain, Grasses, and other Vegetables of general use.

Nor are Land-floods the onely Watering, for Springs that arise from any improving  
Minera,

Minera, carry with their water many improving Particles: I remember particularly that I was informed by an excellent person, and practis'd Waterer that he had observ'd in some lands of his own, that his Improvement made by floating with the water, that came immediately from chalk springs was very considerable to him, nor much inferiour to Land-floods.

For drawing the water over Land, the use is, that by the eye or level which is easily made to help the eye, First, Discovery be made where the water may be conveighed over the most Land: Then Mr. *Blith* advises, to cut out the Master Trench or Water-course, to such a bigness, as may contain all the Land-flood, or at least, be able to bring it within the Land intended for this improvement: When the water is brought thither, carry it along in a foot broad Trench, or lesser, all along the level: If the level be too dead, the lesser stream will follow, so that a convenient descent must be minded, to give the water a fair passage. If there be discovered in this lesser Trench, any mistake or failing, it may with ease be amended, by going higher to, or lower from the level, and the first Trench be stopt up again, for this Trench need be no deeper then the thickness of the upper Turf: This done, the Water-course must be cut out, which must be large enough to contain the whole Water which is intended for the enrichment

ment of the Land, which largeness ought to consist in breadth, and not in deepness, for a shallow Trench, about a foot deep, is best for this work: When the Trench is brought near to the end of the Land, it is to be drawn narrower and narrower.

Further directions the Author gives the Improver, in these words.

As soon, sayes he, as thou hast brought the Water upon the Land, and turned it over, or upon it, be sure thou take it off as speedily as possibly, and so fail not to cut thy work; so as unless thy Land be very sound, and thy Land-flood very rich, thou must take it off the sooner by a deep draining Trench. Therefore I prescribe no certain breadth, betwixt floating and draining Trenches; but if the Land be founder and dryer, or lieth more descending, thou maist let it run the broader; and as the Land is moist, sad, rushy, or level, let it run the lesser breadth or compass; and for the draining Trench, it must be made so deep, that it go to the bottome of the cold, spewning, moist Water, that feeds the Flag and Rush; for the wideness of it, use thine own liberty, but be sure to make it so wide, as thou maist go to the bottom of it, which must be so low as any moisture lieth under the upper and second swarth of the Earth, in some Gravel or Sand, or else where some greater Stones are mixed with Clay, under which thou must go half one Spades graft deep at the least:

Yea,

Yea, suppose the corruption that feeds and nourisheth the Rush or Flag, should be a yard or four foot deep, to the bottome of it thou must go, if ever thou wilt drain it to the purpose, or make the utmost advantage of either floating or draining, without which, thy Water cannot have its kindly operation. The truth is, otherwise the benefit might happen to be no greater then the Patients, who incur'd a Dropsie in his cure from a Feaver: whereas by this means there is a double benefit, the firſt whereof comes by the commodity of watering, the ſecond, by the dreining Trenches neceſſarily annexed thereunto. But whereas the aforesaid Author commends watering or floating, as an help to boggy, rushy, quagmiry Land, I suppose no benefit, but hurt would arise thereby to ſuch Lands, if these dreining Trenches did not open the paſſages of the obſtructed Springs original cauſes of the Bog or Rushineſſ, as well as let out the Water newly introduced by the floating.

The time of the operation for this improvement, muſt be when the Grass is all off the ground, for elſe the ſoil will ſtain it that comes along with the Flood: Often watering is good, but to keep it long in a place, breeds the Rush.

For this operation therefore, there are ſpecial Rules, To begin your work betimes in the year; affoon as the grass has done growing,

ing, and is eaten off, That the stream or float  
that runs over the grass be as shallow as possi-  
ble, and the water continue its running; It  
must be no deeper than the short grass which  
must strein the water as it floats, for else the  
hungry water may lie still at the roots of the  
Grafs, and the fat run over it; Likewise it is  
to be provided, that by reason of the uneven-  
ness of the ground, the water stand not, nor  
restagnat as in a pool on any part of the  
ground, for the same reason, because the  
Land-flood then would pass along upon a  
level of restagnant Water, and would not  
touch the turf or grass which ought to enter-  
taine, and stay, and arrest the richness, and  
fat of it. By this very Husbandry, Mr. *Blith*  
brings precedents of Improvement of Land,  
from Eighteen pence, to Thirty shillings an  
Acre; and Mr. *Plat*, from One shilling to  
Five pounds.

*Virgil* mentions this watering, as an Im-  
provement practicable upon land sowed with  
Corn, which is not ordinarily practised in  
England, though I suppose it might be in some  
places used with very good success.

*Quid dicam, jacto qui semine cominus arva  
Insequitur, cumulosque ruit male pinguis arene  
Deinde satis fluvium inducit, rivosque sequentes,  
Et cum exsustus Ager morientibus effuat herbis,  
Ecce supercilio clivosi tramitis Undam  
Elicit, illa cadens, raucum per levia murmur  
Saxa ciet, scatebrisque arenita temperat Arva.*

*What*

*What shall I say of him, bath sowed his Land,  
Then streight goes on, casts heaps of barren sand,  
And streams to his Corn in flowing Rivers turn,  
And when scorch'd fields with dying herbage burn  
From rising ground conducts a chrytal lake ;  
Which 'mongst smooth stones doth gentle murme  
(make,  
And bubling forth, refresh the parched field.*

Another Remedy for dry and light ground, such as abounds in sand and gravel, is *Marl*, an earth most commonly slippery or greasy to the touch. Of this denomination there are divers kinds, and those of different Natures, for colour, some are blew, some grey, some yellow, some red, some hard and stony, some soft and mellow. But if fit for improvement, it must be alwayes friable, so as to slack after Rain, and never again apt to return to it pristine crustiness and consistence, but rather to resolve it self further and further into dust and powder.

Most sorts of Marl fadden naturally, so as to make Ry-land fit for Wheat, Barly, and Pease, and therefore must not be used twice or thrice together, without some other more natural Compost, such as our ordinary Dungs are. It is a ruled case, that whosoever lays down any Marled land from Tillage to Pasture, must first well Dung it.

But still Chalk is to be preferred before most sorts of Marl, both for its sureness and readiness,

readiness, and is suitable to all soyls unles Chalk it self; It improves upon Clay especially, but upon Sand and Gravel also upon the first breaking up, and sowing grounds for Corn. And the Improvement thereby is so great, that Husbandmen in divers places fetch it three or four miles in Carts for their Use, and yet it is a great question, by what Principle it improves, whether by communicating any particular fatness, or other meliorating parts, or which is rather believed, by Mechanically serving to those motions that assist those little fermentations that are necessary, and by hindring the ground from settling into its old Constitution by its continual moultring and friability.

The general proportion of Chalk for an Acre, is from 40 load to fifty or 60. Clay requireth the greatest proportion. In the Isle of *Wight*, they use a stony concrete of a Marly nature, that mouldereth not so fast, as Chalk, and therefore they are forced to apply a double proportion, using sometimes above a hundred load upon an Acre.

It is Mr. *Bliths* observation concerning lime, that it is a suitabler manure for light, sandy earth, then for a wet and cold gravel, but for a cold hungry clay worst of all. For lime being once slackened doth sadden exceedingly, contrary to its nature in the stone, and so it turns light land into a state able to bear good Wheat. About 12 or 14 quarters of Lime

serves an Acre, for Ground may as well be over as under limed, after liming, till your Improvement not long, but turn it again to pasture.

I have sometimes thought the reason why Lime agrees not with Clay soyl, to be this, because Lime draws moisture abundantly; every one that useth it, observes that if it lyeth in the Air, it will quickly draw moisture enough to slack it self in the heap. And moisture binds Clay above measure. It hath been observed in some Clay soyls, where I have had occasion to Travail, that a Glut of Rain fastens their field ground. It being not suddenly trod in, and mixt, and taketh away the rottenness of it, and bindeth it beyond what a man that is a stranger to it would reasonably believe.

Having mentioned so many others, I must not pass by the Observations of Sir *Kenelme Digby*, concerning the improvement of Salt-Peter, which he giveth us in his History of the Vegetation of Plants.

By the help, saith he, of plain Salt-Peter, diluted in Water, and other fit earthly substance that may familiarize it a little with the Corn, I have made the barrenest ground far outgo the richest in giving a plentiful Harvest; I have seen Hemp-seed soaked in this I quor, that hath in the due time made such Plants arise, as for the tallness and hardness of them, seemed rather to be Coppice wood of

of fourteen years growth at least then plain Hemp. The Fathers of the Christian Doctrine at *Paris* do still keep by them for a Monument a plant of Barly consisting of 249 stalks, springing from one root or grain, in which they counted above 18000 grains of Barly. Nor is it barely the Salt-Peter imbibed in the Seed or Root that causeth this fertility, No, that would be soon exhausted, and could not furnish matter to so vaste a progeny. The Salt-Peter there is like a Magnes which attracteth a like Salt that fecundateth the Air; For as the Cosmopolite sayes, there is in the Air a hidden food of Life. This Spirit then that is in the Air, is drawn as it were by a Load-stone by the Faline liquor that is imbibed into the seed. In a Villa at *Rome* I sowed some Barly thus prepared, and what with the Dew, and what with the Air, and what with the Sun, I should in the morning, by then the Sun-beams had dried up the superfluous moisture, see sproutings up of a pure Salt-Peter of a prodigious height all about, and over the seeds that lay slightly covered with the loose mould. They would be above an Inch, nay two Inches long of the purest Chry-stalline Salt-Peter that could be seen. And it is upon this Principle, that the Pope in his State, and the old Duke of *Bavaria* in his, did first make, and then nourish Mines of Salt-Peter; whose Roots and Quarries are far different from other Minerals, for they are underfoot

derfoot in the Earth, and these over our heads in the Air. This is a pure extract drawn by the Sun-beams from all the Bodies that he darteth his Rayes upon, and sublimed up to such a height of place as leaveth all feculence behind it ; and is there in that exalted Region baked, and incorporated with these very beams themselves which did refine this extract out of its drossy Oare. And it appears by the Antient Georgicks, that the use of the steeping the seed in Salt-peter is no new invention,

*Semina vidi equidem multos medicare serentes,  
Et nitro prius, & nigra perfundere amurca,  
Grandior ut fetus siliquis fallacibus esset,  
Et quamvis igni exiguo properata maderent.*

Virgil Georg. I.

*I have seen many to anoint their Seed  
With Nitro first, then lees of Oyle to spread.  
Whence larger Grain the empty husks did fill,  
Which with soft heat did into ripeness swell.*

Num. 4. Remedies for accidental annoyances and hindrances of Improvement, particularly the ways to destroy Fern, Heath, Ant-bills, Moss, Rushes, Rest-harrow, Broom, or any such Weed or Shrubs that infect the ground : Whether lining of Corn prevents blasting, the effects of that and Brine in Improvement : Concerning Moles, and the ways to destroy them or drown them ; Of Antipathy, as to this effect, in Animals and Vegetables to the Bodies of their own kind, when they are in the way of

*Plowing to kill Fern, Heath, Weeds. 187*  
*of Corruption: Mr. Blith's way of preserving*  
*Corn from Crows, Rooks, &c.*

When any Land runs to Fern, Heath, or Ant-hills, Mossiness, Rushes, Coldness, or any other Weeds or Shrubs, as Goss, Broom, Furz, &c. The most proper and improving remedy, is, to plow it three or four year, and then lay it down in good heart. In which operation, care must be had to Plow up the Weeds clean, and burn the Roots of them in heaps, which warms the ground, and to give it convenient dunging every year, for so the greater shall the improvement be. This Land must be cast into Furlongs, that the Furrows may convey the Water one to another into a general Trench, that it lie not upon the Land.

If the Land be cold and moist, lay it the higher on ridges; if hot and dry, sandy, or the like, let it lie flat, that it may better retain the Rain water.

Be sure you Plow up the Rushes, Brakes, or other annoying Weeds, and for fail, let some body with a Spade, follow the Plough, to root up such as are left after the Culter and Plow-share.

Harrow this new broken ground, with weighty, sharp, and long tined Harrows, such as 'tis a Teems work to draw, that uneven places may be torn up, and good store of mould raised. Cover your Seed with two or three sorts of Harrows, each Harrow having

times thicke: then the other: some put weights upon the Harrows in the first, and a Thorn under them in the last operation.

After four years Tith, lay down your Land, and that upon a Crop of Wheat or Rye, not on a Summer Corn, for so the Soard will come the sooner, especially if the Crop be sowed thin, and as early as may be: If you will double or treble the Improvement, the Husbandry of sowing Clover-grafs, spoken of in the first Chapter, will here come in most properly. In this last Plowing, regard that the Ground be laid down smooth, yet on ridges if the Land be cold, and unless the Land be of exceeding strength, fail not to manure it by dung, or otherwise, this last season of plowing.

Mr. *Blith* reports, and Mr. *Hartlip* likewise, That the natural helps to preserve Corn from blasting, is the steeping of it in thick fat water, or Lime-water, Urine or Brine, or the mixing of Lime or Ashes, with Corn well wet and moist, that so it may cloath it self with the finest of the Lime or Ashes, &c. so as it may fall cloathed all over to the Earth, and so be covered therewith: But I believe he was mistaken in the applying of the Medicine to the prevention of the right and proper disease: I have heard such who practised these Medicines, affirm, that they have generally, and with reasonable good success, used those remedies to prevent smootiness; but the very last

last year it was observed, that where those means were used, the blast did as much harm, as on the adjoining Lands where there were no such Applications made to the Seed. And blasting being the perishing of the tender Kernel, by reason of a Wind (which from effect is sometimes called a red Wind) that too sharply, and it may be with some Venome breaths on it at its first beginning ; I see no reason that such infusions or applications should be any defence, for it comes from an outward violence, and therefore it is most usually seen, that not half a Tree onely, but half a bough shall be blasted, while the other half of the same, that grows by one and the same nourishment, remains free, sound, and well coloured.

And the like may be said of Mildew, that it is not to be prevented by Liming or Brining, or any the like means. It is a good account of the Cause and Cure of this Accident that is delivered by Mr. *Remnant* lib.2. cap.1. Mildew (saith he) is a fine thin, sweet dew when it falleth, no dew or water in the Earth is so thin as I know of; yet if it lye till the Sun or heat come upon it, or winds dry it, then it becomes clammy stiff and binding; but the worst effect that it hath is upon Wheat and Hops.

It falls commonly in the warmest and stilllest weather, it is exhaled or drawn up by the Sun out of the flowers, and from sweet things

or sweet places of the Earth, and it is most frequent in the height of Summer, and warm weather, especially a little before Wheat Harvest : so that Wheat is taken by it when it is full Corn in the Ear, and the straw is dry, and beginning to change white. It falleth sometimes in the Night, sometimes in the Day, but most of all in cloudy, misty, gloomy weather. The which to find out, keep Bees, and they will be your Intelligencers.

If it fall in the night, they will out to gather as soon as day is light ; or if it fall by day, they will abroad together though it fall fast, and as big as a pretty raine. Therefore when you see them fly thus early and diligently, be sure there is a sweet dew fallen, then make hast before the Sun or dryness cometh on it, and get help, and away into your Wheat, and with a Line or Rope run over your Wheat, as fast as may be one in one furrow, and another in another furrow, a Land two or three distance, as you can well reach, one at one end, and the other at the other end of the Rope or Pole ; and the least touch or wagging will shake it off, it is so exceeding thin when it is new fallen ; yet if you have time and help, it were good that you went backward as well as forward to make sure work. But if you let the Dew alone, it will stick fast when heat or dryness cometh on it, and so in time will set your Wheat, so that no moisture or nourishment

can

can come out of the Root into the Ear, and then your Corn shrinks in the Ear for want of nourishment.

This Dew will in time stick fast, and become clammy, and bind like Turpentine or Birdlime; first straked on the straw, and within a while all black over, and round about the straw, while the Wheat is green, and that there is no moisture in the straw so long the mildew doth no hurt; so likewise when the Corn is hard, and dead ripe in the Ear, it is past danger: so that the greatest hurt is done between the time that it begineth to change colour, and the full ripening; and if you be careless and negligent in this time, be sure your Wheat will be dried up with the Sun, and shrank in the eare, and blasted, which by Gods blessing, and your small pains and diligence, you may prevent. Some have slighted and contemned this weak means for a while, but after better consideration, have made use of it, and found the profit and benefit, and were thankful for it.

The Mildew is also to be perceived upon the Oak leaves shining and sweet, but having your *intelligencers* at home, you need not seek abroad.

Concerning the blasting by Wind, and cold or hot Aire, it is not very frequent in our Countrey thanks be to God; yet Rye and Fruit is sometimes blasted by some of these, and hops very often by the Mildew. When therefore this Dew falleth, shake your Hop poles,

poles, and with a gentle Wand beat of this Dew from the leaves, and if it be not too much labour, wash it off also by throwing water, if you see that it will not come off with shaking: For if it stick on, and continue, you shall see Worms and bobs Breed, and stick there, and so spoil your Hops, and they will be lowfy and filthy, and much impaired if not all lost. Now, if you be diligent and watchful herein, you may by Gods blessing, receive double, and treble, or greater recompence of your pains, and preserve abundance which the former Ages have lost.

The same Author in the 3d Chapter, speaks thus concerning the Cause and Remedy of smutty Wheat: We see (saith he) that most will make choice of the fairest, freest, plumpest, and weightiest Wheat for Seed, and they think that they do well in it; but observe it better, and make other tryals of it, and see what will come of it. Is the fattest Ox or Cow the best to keep? But to instance in my own Element, do the fattest stocks of Bees prove better or the most fruitful? No surely, I find that good middling stocks, that are mending, prove best and swarm oftenest; and the very fat ones, prove leaner, and sometimes die, but seldom swarm. So take it to be in this case; when Wheat is at the best, it doth soon decay, and become worse, yea naught, and worse then naught. You shall see it come up in great plenty, blades enough, and straw enough,

enough, and shoots the Eare, and bath its  
Corn in the Ear ; but sudainly it perisheth,  
and dieth in the Eare, and becometh naught,  
vile dust, worse then the earth, and of no use,  
purified, dead and gone. You may see it at  
a stand, and dead in the Eare, the Eare gaping  
and staring, much differing from the oþer  
that hath life and vigour in it. And if the  
Land be not in very good heart, much of your  
Wheat will be thus spoyled, and the more  
comes up, the greater bulk, the more will  
perish, and become black, and will foyle all  
your good Wheat in the threshing, and will  
make it black at the ends : and it hath a damp  
and faintish smell with it, and I think is not  
wholesome to eat ; therefore pick or lease it  
out of the sheaf before you thresh it, or you  
had need wash it well, and dry it after it is  
threshed, before you eat it. Therefore when  
your wheat is very fair, plump, and weighty,  
use that rather to spend in your house, for it  
yields more, and better flowre ; but for seed,  
choose a middle size, not so great, nor yet of  
the smallest ranck, but a middle sort.

Another reason to prove that Wheat, when  
it is at the best, decays soonest, you shall see  
in this following Experiment. Sow of this  
Wheat the next year, whether it be washed  
or not washed, yet it will be very smutty ;  
whereas if you sow leaner, or a middle wheat  
on the same Land, and the same Season,  
yea, that very day, yet the one will turne  
smutty,

smutty, and the other will not, which proveth that the plump and fullest Wheat, being at its height and period, returns, decayeth, and cometh to nought.

There is a procedure mentioned among Mr. Speeds notes, for liming Corn that carries a good probability of advantage with it. First, The Grain was steeped in strong Brine of Salt, that would bear an Egge twenty four hours, and then being laid S. S. S. with Lime, (that is) there was laid a layer of Corn first, and then a layer of Lime, and then again a layer of Corn, &c. the Lime cleaved to the Wheat, and was sowed on ground not worth two shillings an Acre; the effect was, That it bare as good a Crop of wheat as ever was seen in *England*, and afterward three Crops a year of Clover, exceeding good, one whereof was equal in value to a Crop of Wheat: This being matter of Fact, I believe it, as to improvement by fertility, because the Brine works very considerably in small proportion, and Lime in this conjuncture may do well, both to fertility, and defence of the Grain against Grubs, and Insects, and Worms, that abide in the Earth; but surely as to blasting, and Crows and Birds that spoil the Corn in the Ear, it has no influence.

Moles by watering are drowned, or driven up to so narrow a compass, that they may be easily taken; I have known them to have been forc'd to leave their holes to run upon the

Turf,

Turf, to save their lives from the waterflood. Mr. Blib relates, that one Spring, about March, one Mole-catcher and his Boy, in about ten dayes time, in a ground of ninety Acres, being just laid down from Tillage, took about three Bushels old and young; they were not to be numbred, most of them being young and naked, and this he onely did, by casting up their Nests, which are alwayes built in a great heap, of double bigness to the rest, most easily discerned, and then the old ones would come to look their young, which he would snap up presently also: At another Season then March, which is their time of breeding, such success is not to be expected. In other times the best way is, if there be any Hedges near, to set the Gins or Traps there, for their ordinary roads are in such Hedges, and other places they cast up, are but of uncertain use; as when they intend forage for one time, though it may be that they mind the use of that passage no more at all. *Bellonius* advises to bury Moles in those places, whence you would drive the rest of that Vermine; and there may be somewhat in that remedy: For many living Bodies have a great dislike to, and antipathy against the putrified Bodies of their own kind: Thus worms, putrified at the Belly of a Child outwardly, and the powder given inwardly, are esteemed as Medicines destructive to the worm in the Belly, though the latter way is by some thought to breed more

more then it kills. Nay, in Vegetables 'tis agreed, That a young Orchard will not thrive among the Roots of an old rotten Orchard, the reason whereof, some suppose to be the antipathy of the young, against the old putrefying Roots ; but of this effect, other reasons may be as probable.

There be some other remedies for the same annoyances, as particularly, for the destruction of Ferne, the Author named gives this prescription : In the Spring, when the Ferne begins to grow a little above the Grafs, while it is young and tender, take a crooked Pot, or piece of wood about six foot long, coming in at one end like a Bow, or made like a blunt Sithe ; with this strike off all the heads of the Fearn, as low as you can, even to the ground, if possible ; do this the second or third time, and it proves generally a certain remedy. The reason, as I suppose, is the putrefaction of the Ferne, it being a very moist Muscillaginous Plant, by its own juice, and the moisture of the Earth, by which the very Roots themselves come to be corrupted, or else the deprivation of all the Buds that germinate from the Root, by cutting off the Sprouts so unseasonably.

For Ant-hills, to destroy the Insects, and take the hills down, this manner is prescribed ; Divide the upper Turf into five or six parts, then take it down with a turfing Spade to the bottom of the Bank, the Turf being

cut

cut as thin as can be under the Roots of the grass ; then take out the Core of the Banck, that when the Turf is returned to its place, it may lie there lower somewhat than the surface of the Earth, that the moisture, which will be a certain destruction of the Ants, may a little reside there : This must be done in November, December, or January, that the roots of the grass may the better take to the ground before hot weather comes in the Spring.

Among Mr. *Speeds* notes, there are these Receipts; take red Herrings, and cutting them in pieces, burn the pieces on the Mole-hills ; or you may put Garlick or Leeks in the Mouthes of their Hills, and the Moles will leave the ground. I have not tryed these ways, and therefore refer the Reader to his own tryal, belief, or doubt.

I had almost forgot to mention the change of Seed from grounds of a contrary nature, which by the experience of Husbandmen is found very advantagious, and is thought to prevent smootiness. 'Tis the custome in *Buckinghamshire*, for those of the Vale, to buy their Seed from the Chiltern, on this account; and this experiment is found profitable in Wheat, Barly, Pease, and all Field Grains ; and not so only, but also in Garden Plants.

For the preserving early or late sowed Corn, or the same when it begins to corn in the Ear, from Crows, Rooks, or Jack-Daws, Mr. *Blith* has invented this Scare-Crow : You must,

192 Remedies against Crows, Rooks, Dam.  
must, sayes he, kill a Crow or two, and take them into the field where they haunt, and in the most obvious, plain, perspicuous place, make a great hole of two foot over, and about twenty Inches deep, on the highest ground in the Field, which hole must be stuck round about the edges with the longest Feathers; the bottom must be covered with the shortest, and some part of the Carkass; and that Turf or Earth that is digged out of the hole, being laid round upon a heap, you may stick round with Feathers also. One Crows Feathers will dress two or three holes, and about six or eight holes will serve for a Field of ten or twelve Acres. The Feathers will remain fresh a Month, unless store of Rain or weather beat them much; and then (if needful) they must be renewed.

*of another remedie against Rooks.*

*Take of Rooks and plucking it limbo from limbo cast 10 several limboes about y<sup>e</sup> field, with will more terrify them then y<sup>e</sup> former expedient.*

Aug 13<sup>2</sup>

CHAP.



## C H A P. VIII.

*Of the Means of Improvement and best culture of such Plants or Flowers as are usually cultivated in Gardens or Orchards, and of the ways used for the removing of such annoyances as are commonly incident to them.*

Num. I. *Of the annoyances in general, incident to Garden Plants.*

**T**He Politician speaks it to be a part of as great skill and prouess to defend a place already gotten, and to improve it to the benefit of the Prince and Inhabitants, as it was at the first to arrive at the Conquest; this is alike true in the Gardiners Province: It is no easie thing with him to raise a stock of choice Plants, by the several ways of propagation above mentioned, and as hard to preserve them, being propagated, from destruction by forreign and intestine violence. For either the sharpness of cold, the torrid-

ness of the Sun, Vermine, or other accident from without, or want of convenient and nourishable soyl of earth and water, and other Elements proportionable to the Plant, will be such internal deficiencies, as to cause utter destruction: or the hastiness and premature, or on the contrary, the tardy and slow germination thereof will hinder its excellency; or weeds, or other vegetables, may grow up to its hinderance: and many other impediments there are, which with their several remedies, as they shall suggest themselves to my thoughts, I shall propose in the present chapter, the last of this discourse.

### *N. 2. Of defences for choice Plants from cold.*

One great annoyance to all choice flowers and tender Plants, arises from the violence of the Winter cold, the defence against which you shall have as far as I am able to give you, and can think of in the following directions.

First in the Kitchin-garden, Asparagus and Artichokes require some defence; Asparagus is usually covered with Horse-dung which they rake from it in the Spring. Artichokes are usually set in Rowses two foot and half a funder, and are preserved in the Winter by trenching them, and filling the trenches with dung that will not freeze, but keep the ground from freezing all above it.

Then

Then secondly, in your Flower-garden let those Bulbous Roots that are tender, such as the great double white Daffodil of *Constantinople*, and other fine Daffodils that come from hot Countries, the *Ornitbagolum Arabicum*, purple Mountain, Moly, &c. be planted in a large Tub or pot of earth, and housed all the Winter, that so they may be defended from the frosts, or else, (which is the easier way) keep the Roots out of the ground every year from *September* after the leaves and stalkes are past until *February*, in some dry, but not hot or windy place, and then Plant them in the ground under a South-wall, which are Mr. Parkinsons directions.

Also the late Pine-aple Moly; the Civet Moly of *Mompelier*, the little hollow white *Aphydil*, which though its roots are not glandulous as to be capable of the last way, yet they are well preserved many years if by housing they shall be defended from the winter wet and cold.

Rose-bay Mirtles, the *Indian Gelfimias*, *Jucca Indica*, Orange-trees, must be housed in the Winter, so likewise while they are young, the Cyprefs, Bay, Piracantha, Mirtle, Pine-tree, Rose-bay with Spanish-seed, or at the least they must be covered with Straw, or Fern, or Bean-hame, or such like thing laid upon cross sticks to bear it up from the Plants till they are two or three years growth, and fit to be removed to their places. *Arbutus*, or

196 *Defence of choice Plants from cold.*

the Strawberry-tree, Sea-Ragwort, the Pomegranate, and the Indian Figge require the same care.

The way of preserving Myrtles, Oranges, and other tender Plants, as it is practised by that most ingenious Florist and Gardiner Mr. *Kose*, is thus directed by Mr. *Rea*. All these Plants, saith he, are commonly set in cases, and with Oranges, and tender Plants, housed in the Winter, and increased by Layers. The best time to Transplant the more hardy kind of Greens, is about the tenth of *March*, and for the more tender to be set in cases toward the end of *April*; the Earth you set them in must be fresh, and such that hath long lain on an heap well mixed with good old neat's dung well rotted and screened, set not your roots too deep by any means, rather chusing to leave some part of the roots uncovered, then to place them too much under ground: as soon as they are set, water them, and keep them sheltred from Wind and Sun, until they have taken root, after a fortnight, you may by degrees acquaint them with the Air, and when you find that they have gotten strength, then set them abroad. The same order is to be used with such Layers as you shall take off to Plant in cases in *August*.

Commit your cases with Oranges, Myrtles, and other tender Plants betimes into the Conservatory, but shut them not up in the day time, especially unless constrain'd by Fog

or Frosts, which lasting long, you must on fair dayes acquaint them with the Sun and Air again by degrees: During extream Frosts, and when water will freeze in your Conservatory, in default of stoves or raised hearth, you must attemper the Air with pans of Charcoal, especially at night let the Coals be half burnt out before the pans be placed, and then not set too near the Plants. In *March*, when the great Frosts are pass't, open the doors and give them Sun and Air by degrees, a little at first which increase with the Spring; about the end of *April* set them forth, and wash them clean (especially the greens) with a watering pot, from Dust and Cobwebs. And you must not forget whilst they are in the house to wa-  
ter them gently, especially in *November*, and after long frosts, but let not the water touch the leaves of any of the greens, and chuse rather to give housed Plants too little, then too much water. Assoon as the heats begin, cover the Earth in the Cases some considerable thickness with Moss. It will keep the Earth moist and friable, and water them as you find cause every Spring and Autumn, that is, a little before you set forth your Plants, and before you house them, you must take some of the earth out of the cases, and open the rest with a fork or other tool, not hurting the roots of the Plant, and fill them up again with ranck Earth, two parts Dung well rotted, and preserved for that and such like purposes.

*Ferrarius* commends a Garden-house with Walls of thick Moss as good, and so without question it is, against the Winter cold and Summer heat.

Some defend their Mirtles, Pomegranates, and such other tender Plants, either by houses made of straw-like Bee-hives, or of boards (with inlets for the Sun by casements, or without them) Litter of Horse-stables being laid in very cold weather about the houses of defence.

It was a custome in *Italy*, to make such fences for Myrtles (especially when young) as appears by *Virgils Verse*,

*Dum teneras defendo a frigore Myrtos.*

The Roots of the Marvail of the World, Mr. Park has preserved by art a Winter, two or three, (for they'll perish being let out in a Garden, unless it be under a house side, or such dry place) because many times the year not falling out kindly, the Plants give no ripe seed, and so Gardiners would be to seek for seed to sow, and Roots to set, if this or the like Art to keep them were not used: 'Tis thus, within a while after the Frosts have taken the Plants that the leaves wither and fall, dig up the Roots whole, and lay them in a dry place for three or four dayes, that the superfluous moisture on the outside may be withered and dried; which done, wrap them up severally in two or three brown papers, and lay them by in a box, chest, or tub, in

some

some convenient place of the house all the winter time, where no wind or moist Air may come unto them, and thus shall you have these Roots to spring afresh the next year, if you Plant them in the beginning of *March*, as Mr. P. has by his own relation sufficiently tryed. But some have tryed to put them up in a Barrel or Firkin of sand and ashes, which also is good if the sand and ashes be throughly dry, but if it be any thing moist, or if they give again in the Winter, as it is usual, they have found the moisture of the Roots, or of the Sand, or both, to putrifie the Roots.

The same Author takes notice that it is one great hurt to Gilly-flowers in the Winter, and to all other herbs, to suffer the Snow to lye upon them any time after it is fallen; for it doth so chill them, that the Sun doth (though in Winter) scorch them up, shake therefore off your Snow gently, not suffering it to lye on a day if you can; There is the like inconvenience from Frosts which corrupt the Roots, and cause them to rot and break, For prevention, take Straw, or Litter of an Horse-stable, and lay some thereof about every Root of your Gilly-flowers, especially the best sorts, close unto them upon the ground, being careful that none lye upon the green leaves, or as little as may be: Let it lie till *March* (with its winds) is past. The general remedy for these, and all flowers, is to be covered with Mats, which are removable

able at pleasure. The choicest of all are put in pots and housed.

Now though those who are very careful, commend the forementioned ways, yet there are others blame these practises in the case of **July-flowers**, as being noxious to them, and hindrances to their flourishing and fairnes, advising rather that they be neither potted nor cover'd with Mats, which use draws Mice and VVorms to them, which do them more harm then the winter it self, being contented for their improvement to place them in good mould, and not to suffer too many slips on a Root, and observing this in the pruning, that you do not slip them, nor cut them off in a joynt, the first of which wayes causes a great wound in the Mother plant, and the second is very prejudcial on other Accounts.

Num. 3. *Of shades requisite to sundry Plants, especially when young, for their defence from the Sun and Wind; with an Advertisement from Mr. Rea for the improvement of the double yellow rose.*

All sorts of Carnations, Gilly-flowers, and Plants that are tender and young, especially your **April** and **May** Seedlings, are to be preserved and defended from the violent heat of the Sun and blasting winds: I have seen whole Beds of divers sorts of young Seedlings, utterly burnt up at their first appearing, by the violence of two or three hot days. Nor do Seed-

Seedlings only require this, but all Plants that are not altogether wild, of how woody substance soever, that are newly growing, from cuttings, or parts without actual Roots.

Shades are commodious, if not absolutely necessary to many Plants, even when they are well rooted, as Bays, Lawrel, Savin, and most wood-plants, a mixture of Shade and Sun to Straw-berries; so that the Lord *Bacon* wittily advises, to sprinkle a little Porage-seed on the Strawberry-bed, for that the Straw-berries, under those Leaves, grow far more large then their fellows.

The best shades are made by thin well pruned Hedges drawn through the Garden or Nursery, or by Mats laid over them, and underpropt by a frame of light Poles: But all Seedlings, Flowers, or other Plants that are kept in Pots, are readily removed into convenient shade at pleasure.

Among the requisites for the Improvement of the double yellow Rose, this of shade is one, but because the improvement of this Plant hath been a particular care of the most ingenious Mr. *Rea*, I shall set it down in his own words. ' VVhereas, saith he, all other Roses are best natural, the double yellow is best inoculated upon another Stock; others thrive and bear best in the Sun, this in the shade; therefore the best way that I know to cause this Rose to bring fair and kindly flowers, is performed after this manner;

' First

‘First in the stock of a *Francfort Rose*, near  
‘the ground, put in a bud of the single yellow  
‘Rose which will shoot to a good length, then  
‘half a yard higher then the place where the  
‘same was budded, put into it a bud of the  
‘double yellow Rose, which growing, the  
‘Suckers must be kept from the Root ; and  
‘all the buds rubbed off except those of the  
‘kind desired, which being grown big enough  
‘to bear, (which will be in two years) it must  
‘in Winter be pruned very near, cutting off  
‘all the small shoots, and only leaving the big-  
‘gest ; cutting off the toos of them also as  
‘far as they are small ; then in the Spring,  
‘when the buds for leaves come forth, rub off  
‘the smallest of them, leaving only some few  
‘of the biggest, which by reason of the  
‘strength of the stock, affording more nou-  
‘rishment then any other ; and the agreeable  
‘nature of the single yellow Rose, from  
‘whence it is immediately nourished, the  
‘shoots will be strong and able to bear out  
‘the Flowers, if they be not too many, which  
‘may be prevented by nipping of the smallest  
‘buds for Flowers, leaving only such a num-  
‘ber of the fairest as the Tree may be able to  
‘bring to perfection, which Tree would  
‘stand something shadowed, and not too  
‘much in the heat of the Sun, and in a Stan-  
‘dard by it self rather then under a Wall.  
‘These Rules being observed, we may expect  
‘to enjoy the full delight of these beautiful

‘Roses,

Roses, as I my self have often done by my own practise in divers Trees so handled, which have yearly born store of fair flowers, when those that were natural, notwithstanding all the helps I could use, have not brought forth one that was kindly, but all of them either broken, or as it was blasted.

Num. 4. Of Watering.

Another Remedy necessary for the preservation of divers Plants, and improvement of others, is watering. We have already spokē of the improvement of Meadows and Corn-fields by floatings, it remains onely that we consider how it is assistant to choicer Plants.

Water is necessary to all stringy Roots at their first removal, and at any other time when any Trees or Plants are weak by reason of droughth. All manner of Layers must be especially regarded and aided by this assistance, and so must those Plants that are to be propagated by the circumposition of a Basket of Mould. The Plants of Tobacco are also much improved by frequent waterings, Melons, Gourds, Cucumbers, though well rootēd, require this help.

For all these Intents, water that hath stood in the Sun two or three dayes at least is best; but different Plants require for their Improvement a different sort of watering; For those Vegetables that are content with a hungry ground,

ground, will thrive well enough with a thin water Sun'd. But your Kitching Plants are best improv'd by fat water, such as is usually gathered into Ponds after a Land-flood, or from the washing Dunghills.

Yet herein also some Caution is to be used, first that your water be not so foul as to breed flies or other Vermine, but so clear as to be proper to make drink of. *Magnenus Excircit. I. De Tobacco & Manna*, hath this observation, *Anno 1645.* *Estate sicciori* (saith he) *feniculam et alias plantas irrigari jussoram. Aqua sumpta ex puto fatenti. Neramus quidem fuit in fenicula, ne granulum Unum quod Vermiculis non scaterr. Idem absynthio contigit; & nisi advertisset Tobacco adnata erant exiguae Muscae capite nigro, ventre virescente, que planta morbum induxerant, sed mutata irrigatione rediit sua puritas herbae.* In the year 1645. the Summer being very dry, I ordered Fennel and other Plants to be watered; the water was drawn out of a stincking well; there was no branch nor leaf in the Fennel that was not covered with worms. The same happened to wormword, and unless I had taken notice to prevent it; there were little flies with black heads, and green bellies that covered the Tobacco, and had diseased it. But changing the water, the Plant recovered its former purity.

Other Cautions are also to be used, as that you offend not in quantity: For by too much water one may chill & over-glut the ground.

Those

Those are industrious Gardens, that water often, and but a little at a time. In the Spring and Autumne when Frosts are feared, it is better watering at Morning then at Night, but in Summer, the night is esteemed the better season.

There is a pretty way of watering choice Plants, by wetting a streiner, and then letting one end of it hang over a Vessel of water, which will gently draw up the water from the Basin, and let it fall down gently by the streiner to the root of the Plant.

Num. 5. *Of Annoyance by Plants growing too thick, and near together: And of the Remedy thereof, and Improvement by pruning Trees, and setting them at great distances. Of the Improvement of Garden-flowers, by plucking off some of the young Germen, when they are too numerous. Of the sizing of Turneps, Carrots, Parsneps, and of Weeding.*

There is no greater hindrance to the growth and thriving of many sorts of choice Vegetables, then their being so crowded together, that their Roots, Branches and leaves, enterfer with, or at least stand to close one to another, and therefore in all Orchard and Garden plants, whose fruit and flower you desire should be fair, and whose growth you would have considerable, you must provide that they may be set at convenient and proportionable distances.

distances. Apple-trees, Pear-trees, Plum-trees, Cherries, and other Plants, are of divers heights, both when compared in the same, and when in different species or kinds, some Apple-trees grow to a much greater tallness then some others, Pears to a greater height then Apples, so that it is hard to appoint a certain distance for Trees in an Orchard, twenty foot is space little enough for Standards of common Apples or Pears; but a certain Rule is, to provide that one Tree shade not another, and therefore let the lowest Trees, if you intend to make the most of your ground, be set South, and the highest Pear-trees stand to the North; for should the higher Trees stand South, they would cast their shade over the rest of the Orchard.

This Doctrine of setting Trees at such distances, the Husbandman hates, for two reasons; one is, Because it takes too much of his Pasture from his Cattle; and the other is, That by this means he can have but little Fruit in his Orchard for many years: Therefore to gratifie his covetousness, I shall propose him this practicable way of following, and prosecuting my intention to the utmost profit, without putting him to the mentioned grievances. For first, I shall order that he Plant his Orchard full of Trees, within three yards distance one of another, or somewhat nearer, if he please; these shall bear him after a year or two, as many apples as a well

grown

grown Orchard usually carries: then let him set this ground to a Gardiner, that it may be digged and dunged seasonably, to bring Kit-chin Plants, for from this Culture the Trees will receive great advantage. When the Trees are big enough, with the defence of a strong stake, and some Bushes, to be secured from Cattle, let him transplant them into Pastures of the best Soyle, where they may stand at great distances to be shelter to Cattle, and no prejudice to the Grass: One Tree at such distance, shall bear as much as ten in some Orchards, and thus continue removing, as your Trees grow big enough. I count five or six inches about to be a good Size, the bigger they are, the more care must be taken in their removal, that the Root be transplanted entire as may be, without much dis-branching it, or cutting away the spurs. And it is convenient, that in the heat of the first Summer, wet Straw be laid upon the ground about the Root.

If you have no pasture to transplant into, sell your Trees to those that have, or set your Standards of strong Trees at twenty foot distance, and fill up the rest of the ground with Kentish Codlings; Nurse Gardens, Burts, which are cheap Plants, being propagated by Suckers, or with dwarf Trees made by Circumposition, which may be cut down when the other Orchard thickens too much, and in the mean time are very plentiful bearers.

Pruning

Pruning Trees is used likewise  
*Of Pruning.* chiefly to this intent, that the

Rays of the Sun may have pa-  
sage to all parts of the Tree, so that 'tis a  
good way for the Pruner to look upward  
from the North-side of the Tree, upon the  
South and East, and to cut off, or rather make  
thin, such boughs which he finds so thick as  
to obstruct the Sun: All Boughs likewise  
that gall others, and that are actually dead;  
providing always, that the Boughs taken of  
be as little as may be, though the more in  
number, that so the sap may make up the Bark,  
and the Tree be not decayed by lopping of  
the greater Stems: Which is very perversly  
done by most Gardiners, who think that to  
Prune a Tree, is to cut off the lower Boughs  
bigger or less, because they see small watery  
Fruit grow on them; whereas if the Sun was  
let in upon them, their Fruit would be rather  
more, then less forward, than that which  
grows in the middle of the Tree: I count it  
general, that the under Boughs ought never  
to be cut off, but when you have respect to  
grass Roots, or other Garden-stuff, which  
grows under the Trees, or for the security of  
the Trees from the browsing of Cattle, so  
that to bare the Trunk of the Tree, for four,  
five, or six yards, as some do, and nourish it  
to no profit, but to bear and carry up the head  
to another Region, that Rooks may the better  
build therein, is a common folly, and ridicu-  
lous, if well considered.

And

And for lopping off great Boughs, I may here add an observation touching Elms, which is, That if the top of an Elm of any bigness be cut off, the rot will immediately begin there, and by wet, and other accidents, run downward, and cause that hollowness which is ordinarily seen in Trees of this kind.

Another Rule of Pruning is, That the Gardiner never cut off those Boughs which are set and adopted for bearing, which is easily known for Roses particularly, and Raspberries and Vines always bear upon a fresh sprout, shot forth the same Spring, so that the more you prune a Rose, Rasp, or Vine, the more fresh sprouts of that Spring's growth are emitted, and the more such sprouts, the greater number of Roses, Raspberries and Grapes succeed, unless some particular accident destroys them. Many Fruits bear from the shoots of the antecedent Spring, as the generallity of Apples, Pears, Peaches, Nectarins, Apricots: Many seem to grow from Wood of longer growth, but in that a man may be easily mistaken, because a very little, and a Spring of scarce discernable growth, may be enough to serve as a foundation to the pedal of the Blossom or Fruit, which standing on the old Wood, it may be thought that the pedal or stalk of the Fruit, stands immediately on the Wood, and that there was no Spring interceding. Sometimes the Blossoms of the same Tree, stand both on the Wood of the present and antecedent

dent Spring, as it is frequently seen in Kentish Codlings, Nurse Gardens, great bearing Cherries. But where ever the Blossoms are, and there are many Buds fitted and prepared for bearing, they are discerned by the skilful Gardiner, and may be seen by any person, for those are more full in their shutting up than other Buds are, and stand not so close made to the stem of the Branch whereon they grow, and contain more small leaves in their Body then other Buds, being, as I apprehend, the actual rudiment of the ensuing Blossom: Such Boughs therefore, whereon plenty of these full made Buds, or inchoate Blossoms are seen, the Gardiner spares, if he is wise, for the present year, and (where he may) prunes off such whereon he sees no such propensity to fruitfulness.

The best time to Plash, Prune, and nail Wall-trees, is in *February* after the great Frosts are past, except Peaches and Nectarins, which being cut before the rising of the Sap, are apt to die after the knife, and so to stump, and deform the Tree, and therefore such must be left until they begin to put forth buds and blossoms. Spread the branches upon the Wall like the ribs of a screen Fan, or the fingers of your hand displayed, and let not one cross another leaving no place bare; such as will not come handsomely to the Wall, must be cut off close to the stock, and the end of the small branches, (These are Mr. *Rea's* directions)

rections) close behind a leaf Bud, and in the Summer when they put forth new wood, rub off such buds as growing may deform the Tree. After Midsummer you must give your Trees a ſecond pruning, by cutting away the new lances to give Sun and Air to the fruits, to cauſe them to ripen, and to be well co-lored, the well and ſeafonable pruning of Trees in Summer, will cauſe them to be ſer thick with fruit buds, and to bear plentiſfully.

The fairness and largeness of Flowers and Fruits, are very much augmented, by preventing the running up a multitude of Stalks from the ſame Root: The Gardiner obſerves this preciſely in his Carnations and Gilly-flowers, not ſuffering above one, two, or three Spindles upon ſuch Roots or Stools where he intends a greater fulneſs and largeness in the Flowers; and in Anemones the obſervation is, That if any of the Latifolia's bring a ſingle Flower on the ſame Root with the double; then the cauſe usually is, the ſtanding of too many Eyes or Germens, and their depending from the ſame Root; and the remedy in like manner, nothing else but the taking off thoſe Off-ſets or Suckers; and parting them from the principal Root, which otherwiſe is robbed of that matter which might raife in each Flower, both fairness and multiplicity of leaves.

Shrubs likewiſe that bear either Fruits or  
P 2 Flowers,

Flowers, and are to be governed in like manner ; Goosberries and Currants degenerate to smallness, or bear not at all, without this care and provision, that the Suckers be taken away : This observance is likewise absolutely necessary to Damask Roses, for when they grow up to thick Bushes they scarce bear, whereas being kept to grow in one single great stem, being orderly cut, and not growing in the shade, they bear exceedingly.

For Vines, it is a Proverb, make your Vine poor, and it will make you rich : The fewer principal Stems are left, the more it bears, and the reason is, because the Grapes are born upon shoots of the same Spring ; and those shoots then most plentifully arise, when the head of the Vine, in proportion to the Roots, is least, as 'tis seen in all Trees, which shoot out more immediately after their heads are lopt, than any other year. Pompions follow the nature of Vines, and as two or three stems is enough for the Vine, so two or three runners, and no more, ought to be permitted by him that intends the greatest fairness of this fruit.

It may be proper enough here to speak of Weeding and Sizing : The latter operation is, the plucking up Roots or Plants that are of use in themselves, but offensive to others in the same Beds, by reason of their nearness : Thus Turneps are howed up when they stand within a foot distance each of other ; for it is best

best, when at their full growth their leaves touch not one another: Carrots are plucked up, when they are an inch Diameter at the head, for then they are of use, or sooner, if the thickness of their standing require it; and this is general for all Roots, Parsneps, Radish, Skirrets, that grow by Seed: Some sow (as I mentioned above) Parsneps, Carrots, Radish, and Sallad Herbs in the same Bed, first Sizing out the Sallad Herbs and Radish, then the Carrots as they grow, leaving the Parsnips till Winter, by which means their ground is always full, yet by reason of the Sizing in due times, never over-burthened.

The culture of Straw-berries requires somewhat like Sizing, (viz.) The cutting off immediately after bearing the spires and strings, which would multiply unto too many Roots and Branches, to have plenty of fair Straw-berries: Nor is this once only to be done, but as often as they spring anew, so often are they to be taken off, until the time of the Blossoms draws on, I have seen some that were not over curious, tear off the strings by harrowing up and down their Beds of Straw-berries with an Iron Rake.

Some make a question, Whether Plants of the same kind, by reason of a supposal that they require the same parts for nourishment; or Weeds and Grasses, by their too great vicinity, may create more annoyance to their Neighbours? I decide not the question, nor

can reconcile the Gardiner to Weeds, whilst he finds his strongest Plants destroyed by them: I have seen many Trees in a well grown Nursery, spoyled by the Grass that grew amidst them; and as I remember, the very Bark of the Trees themselves was rotted, by a dew cast upon them from the Grass: I have likewise observed, a strongly grown Quick-set of white Thorn, to have been destroyed by Alexanders, which it is at the Readers choice to account as a Weed or cultivated Plant.

The time of pruning generally is the dead of Winter, for such Plants as consist of a woody substance: Pompions are deprived of their superfluous creepers, and other Gourds likewise, at their first time of springing and divarication of their Branches. The season of pruning for acceleration of ripeness, is when the fruit is made, and begins to grow to some bigness, as generally they are, about Mid-summer: Some have a third time of pruning Wall-fruit, *viz.* at the time when the Fruit is taken off, as they do Roses likewise, when the Flowers are newly gone.

To cut the Branches or Sprigs of a Flower or Tree quite off, cannot properly be called pruning, yet sometimes it proves an useful operation for such Plants as are stunted, as they call it, in their growth, or for Trees that are crooked, or have been bitten with Cattle, or are grown old: Thus Wood-men count it best to cut those Stools of under-Wood down

down to the Root, that it may begin to shoot afresh, that have been much browsed by Cattle; and cut down their hedges to the Roots when they grow old and Moisly.

Gardiners likewise, if by reason of a sharp Winter their Anemone's are pinched with cold, and starved, let them not immediately run to flower, but cut off the first Springs to the ground, that in a better Season they may lay a stronger Foundation for the bearing of fuller and fairer Flowers.

Num. 6. *Of Pismires, Earwigs, Canker and rottenness in choice Plants, Catterpillars, Moisness, Bark-binding, Bursting of Gilly-flowers.*

There are many other annoyances to Vegetables, and generally sooner reckoned than remedied, a word or two I shall speak, of as many of them as come into my mind: Pismires, especially those of the black kind, are exceeding troublesome in some Gardens, for they climb the highest Trees, and spoyle the Fruit, are commonly esteemed remediless. Belonius, who took exceeding pains for improvement of Vegetables, commends the decoction or Broath made of any sort of Spurg, as very efficacious for this purpose: Some draw them to one place, by burying Carryon where they most resort, and then scall'd them with seething liquor.

To divers choice Flowers, but Carnations and Gilly-flowers especially, Ear-wigs are a great annoyance: Mr. P's way of setting Beasts Hoofs among the flowers, upon sticks, to take them, is used of every Body here, and generally lik'd: Some that set their Flowers in Pots, set the Pots in Earthen Plates, with double Verges, containing water, or water mingled with soot in the outward verge, to drown the Vermine that shall attempt the pots, and rain water in the second, which may pass through the holes of the pots to water the earth therein contained.

The rottennesse and hollownesse, that through age and too much moisture, bulbous and tuberous roots, and the best Anemones especially, are subject too, is thus provided for; the disease must be laid open, and the rottenness cut out so, that in the root there be no capacity left to hold water, which I have often mentioned to be a great Enemy both to them and Tulips. *Ferrarius*, and some others, prescribe Plaisters of Rosin, Turpentine, and Wax, to apply to the Cicatrices of the wounded Root, which notwithstanding, I have no regard for. The same Author sayes, that in moist Winters Anemones do best in pots, in dry, better in beds: With us they are seldom potted, but the borders for these Plants are usually laid on pretty high ridges, as Husbandmen lay their Corn Land in deep and moist ground, to prevent the mischiefs that

that usually happens by too much wet.

Mr. *Parkinson* sayes, That if you perceive that your Gilly-flower leaves change any of their Natural fresh colour, and turn yellowish, or begin to wither in any part, it is a sure sign that the Root is infected with some canker or rottenness, which will soon shew it self in all the rest of its branches, and therefore betime, (else 'tis in vain) advises that you cover all, or most of the branches, with fresh Earth, or else take the fairest slips from it, or according to Art lay it: This way of Mr. P. may be applyed unto other Vegetables. Or else you may try Mr. *Blakes* Remedy for this Disease in Gilly-flowers and other choice Plants, which is this, Take tarr, and the yelk of an egge, and mans ordure, and apply it to the canker-eaten, and it will cure it.

I know no better way to destroy Caterpillars, Palmer-worms, and other Vermine of that kind, then by crushing their Eggs; as soon as they are laid upon the leaf by the Fly, some brush them off with wet cloaths: 'Tis observed, that the little Fly that usually blows upon the Cabbage, chooses such Plants as are youngest, and especially those that were raised in hot beds, or endured least of cold in the Winter preceding.

Mossiness of Trees, comes generally either from the barrenesse or coldnesse of the ground, and therefore I count it vain to attempt the removal of it, without taking away the

the cause, and making the ground better; which being done, it will be proper enough to rub down the Trees in a wet day with an hair cloath.

Trees likewise are sometimes Bark-bound, especially such, the Grain of whose Bark runs round the body of the Tree, as in Cherry-trees, and not straight upward, according to the grain of the Tree, as in Apples, Pears, &c.

For the Bark is not generally, as I suppose, nourished by apposition of a new rinde to it, as the substance of the Tree is, but by interposition of particles, amidst the particles of the rind already made, which if it be so hard as not to admit other Particles for its enlargement, there can be no new addition of a new coat of wood, which ought to accrue every year to the Tree, for there will be no space wherein the sap may ascend, which is to be hardned into such new wood, unless by renting the whole coat of Bark, which sometimes happens.

The remedy for this disease, both in Cherry-trees, and other Trees, those chiefly whose Barks are hardned and grown crusty by long standing in shadowy places or barren ground, is, that the year after their removal, or upon addition of better soil in streight grained Barks; and without either removal or addition of soil in Cherry-trees, and other cross-grained Barks, or in any Trees whose Barks rend of their own accord, the Barks be slit

from

from the top of the Tree to the bottom of the Stock, and that according to the bigness of the Tree, in one, two, or three places: This is a Chyrurgical remedy that never fails, and is easily performed.

Carnations and Gilly-flowers, happen to be often deformed, especially those which are of the largest sorts, by bursting the Calyx, Cellar, or Case wherein they are set, and the usual remedy is, to inlarge the five incisions proportionably, by cutting them deeper with a knife; or to steep ordinary Beans in Water, and then slipping off the outward coat of the Bean, to put it (the end being taken off) upon the head of the Carnation, which will keep the five lips together, and preserve the Flowers from breaking; nor will these Hoops, made of the coats of Beans, shrink with the heat of the Sun, as those made of the rind of Willow, slipped off for the same purpose, usually do: One Bean is long enough to make two hoops, for they need not be above a quarter of an inch in breadth.

Num. 7. *Of improvement and melioration of divers Sallad Herbs, by blanching or whiting, from the French Gardiner, and Mr. Parkinsons Observations.*

The Lettuce-Royal, being upon removal, set at a foot or more distance, when you perceive that the Plants have covered all the ground,

ground, then in some fair day, and when the morning dew is vanish'd, you shall tie them in two or three places one above another, which you may do with any long Straw, or raw Hemp, and this at several times, (viz.) Not promiscuously, as they stand, but choosing the fairest Plants first, to give room and air to the more feeble, and by this means they will last the longer: The first being blanched, and ready before the other are fit to bind.

If you would blanch them with more expedition, you may cover every Plant with a small earthen pot, fashioned like a Goldsmiths Crucible, and then lay some hot soyl upon them, and they will quickly become white.

*Concerning Succories, Thus,*

There are several kinds of Garden Succories, different in leaf and bigness, but resembling in taste, and which are to be ordered alike.

Sow it in the Spring upon the Borders, and when it has six leaves, replant it in rich ground, about eighteen inches distance, paring them at the tops: when they are grown so large, as to cover the ground, tye them up as I instructed you before, where I treated of the Roman Lettuce; not to bind them up by handfulls, as they grow promiscuously, but the strongest and farwardest first, letting the other fortifie.

There is yet another fashion of blanching it: In the great heats, when instead of heading,

ing, you perceive it would run to Seed, hollow the Earth at the one end of the Plant, and couch it down without violating any of the leaves, and thus it will become white in a little time, and be hindred from running to Seed.

Those who are very curious, bind the leaves gently, before they interre them, to keep out the Grit from entring between them, which is very troublesome to wash out, when you would dress it.

Remember to couch them all at one side, one upon another, as they grew being planted, beginning with that which is nearest the end of the Bed, and continuing to lay them, the second upon the first, and the third upon the second, till you have finished all the Ranges.

I find likewise two other manners of Blanching them for the Winter; the first is, at the first Frosts, that you tye them after the ordinary way, and then at the end of eight or ten days, plucking them up, couch them in the Bed where you raised them from Seeds, making a small Trench cross the Bed, the height of your Plant, which will be about eight Inches, beginning at one end. In this you shall range your Plants side by side, so as they may gently touch, and a little shelving; this done, cover them with small rotten dung of the same bed: Then make another furrow for a second range, in which order, lay your Plants

Plants as before, continuing this order till you have finisht'd: And last of all, cover the whole Bed four fingers thick, with hot soyl fresh drawn out of the Stable, and in a short time they will be blanched. If you will afterwards cover the bed with some Mats placed assant, like the ridge of a House to preserve them from the Rain, they will last a very long time without rotting: When you would have any of them for use, begin at the last which you buried, and taking them as they come, draw them out of the range, and break off what you shall find rotten upon the place, or that which has contracted any blackness from the dung, before you put it into your Basket for the Kitchen.

A second manner of preserving it, is, to interre it, as before, in furrows of Sand in the Cellar, placing the Root upmost, least the Sand run in between the leaves, and you find it in the dish when they serve it. You need not here bestow any dung upon them, it is sufficient that the Sand cover the Plant four fingers high; and when you take it out for use, before you dress it, shake it well, the Root upmost, that all the Sand may fall out from the Leaves. Take them likewise as they happen to lie in the Ranges.

His directions for blanching Endive, are, that you cover it only with reasonable warm dung, and drawing it out at the first appearance of Frost, that you keep it under Sand in your

your Cellar, as you do other Roots, but first it must be almost white of it self.

The whiting of Endive, Mr. Parkinson commends, when done in another manner: After, says he, that they are grown to some reasonable greatness, but in any case before they shoot out a stalk in the midst for Seed, take them up, and the Roots being cut away, lay them to wither for three or four hours, and then bury them in the Sand, so as none of them may lie one upon another, or if you can, touch one another, which by this means will change whitish, and thereby become very tender, and is a Sallot for Autumn and Winter. Fennel is whited by some in the same manner, for the same use.

To procure the Chard of the Artichocks (which is that which growth from the roots of old Plants) you shall make use of the old Stems which you do not account of. For it will be fit to renew your whole Plantation of the Artichocks every five years, because the Plant impoverishes the Earth, and produces but small fruit.

The first Fruits gathered, you shall pare the Plant within half a foot of the ground, and cut off the stem as low as you can possible; and thus you will have lusty slips, which grown about a yard high, you shall bind up with a wreath of long Straw, but not too close, and then environ them with dung to blanch them.

Thus

Thus you may leave them till the great Frosts, before you gather them, and then reserve them for your use in some Cellar, or other place less cold.

Num. 8. *Of Acceleration and Retardation of Plants, in respect to their Germination and Maturity.*

Acceleration of Plants in their Germination and Maturity, is ranked, by the Lord *Vetulam*, among the *Magnalia Naturæ*, and is an operation that all Artists can do something in: though I know not any that arrive to the performance of those grand proposals of some Writers, as that of raising Sallads within an hour or two, whiles a joyn't of Mutton is rosting: The late King of *France*, has been reported to have known a secret process that would produce this effect, and to have esteemed it at a high rate: Cichory was the Seed, as I was informed by Monsieur *Giffonius*, which he was wont to raise so soon into his most fam'd Sallad.

I have tryed divers of the Experiments proposed for procuring those wonderful speedy Germinations, and that by long infusions in Milk, strong Muck-water, and sometimes have added unquenched Lime unto the infusions, according to the Experiments set down by a late Writer, who asserts, that by these usages,

usages, Beans, Pease, and Parsly-seed would grow up in few hours, and can only give the Reader this fruit of my pains, that without any further tryal, he may from my experience be ascertained, that the advantage in acceleration is exceeding inconsiderable by any of these means. It was, by my tryal, found much less than I imagined could have been by any infusion, for none of the Seeds (of which I tryed many sorts) came up the first three or four days; and except Radish, none came up in a fortnights time, though they were sown in *August* and watered.

I have likewise tryed the Experiment of Ashes of Moss: First, burning a great quantity of Moss to ashes, and then taking some of the richest Garden mould I could procure from a rotten hot Bed, and mixing it with the ashes, I moistned it with exceeding good Muck-water several times, and let it as often dry in the Sun; this I did in glazed pans, that the Salt might not be washed from the Earth; then I sowed Seeds, some unsteeped, some steeped, and in the beginning of *September* set the Pans upon the Leads of an House: But in effect, the Sallad sprang not up that day, nor many days after.

The next day I set into some of the same kind of Soyle, made up of Moss-ashes and Dung, watered as above, divers Seeds steeped in Spirit of Urine alone, Spirit of Urine with water mixed, Spirit of Urine mixt with

phlegm of Elder-berries, all without success, though I set them in a Pan of Earth over a gentle fire, to speed the Germination: Formerly I have seen Spirit of Nitre tryed, but to no purpose; some speak of working these sudden Germinations by somewhat made of Salt, Spirit, and Oyl, chymically united into one Body, which when they shall discover unto us, or otherwise make us possessors of, we shall have a better opinion of the related experiment.

As to ordinary Acceleration, hot Beds are the most general and catholick help, and certainly forward Germination much: For Cabbage-seed sown in the Spring on a hot Bed, I have seen, to bring Plants that have in their growth and bigness overtaken such that were re-planted before the antecedent Winter, and so were in the ground, at the least half a year before them; and that in the same sort of Soyl. It is certainly true, that the Germination will be the more quick, the hotter the weather is; and the larger the bed of Dung is made, and the more it is helped by the reflection of Brick-walls, or other like advantages: The manner to make these hot Beds, is mentioned in the first Chapter, and their use there described.

Mr. Speed, Cap. 14. *Of Musk-melons*, Gives us from the testimony of two Noble Men, this advertisement: The way, says he, to have as good Musk-melons as any are in *Italy*, with-

without the unwholesome use of the Musk-Beds here in *London*, is confirmed by the Earl of *Dorset*. Plant them under a Wall, Pale, or Hedge, on the Sunny side, with very good Mould purposely prepared, and underneath the Mould lay a quantity of fresh Barly-straw, and by this easie means, using the seasonable covertures and necessary furtherance, you may attain to your uttermost desire, without any further trouble. But if you do discern the Straw to make the Earth too hot, thrust in a Stake through the Mould to the Straw, that the vapor and heat may evaporate and pass forth.

I have known some Gardiners about *London* and *Westminster* make considerable advantage by accelerating *Asparagus* upon an hot bed, which they performed thus, These roots having worn out the heart of the Earth where they were set in their Ordinary beds, the Gardiner where he found the Earth most cold, and the root decline and ready to perish, takes up a bed or part of a bed at once, and at what time he thinks good in the Winter, he Plants the same Roots upon a new made hot bed, which doth very speedily shoot out a fair Crop of Asparagus heads, which at that season of the Year they sell at a great rate. And this Experiment may certainly be applyed to any other Sallet, the tops or young leaves of which are eaten, only they all must be expect-ed whiter then such as grow exposed to the

Air and Winds, and the Roots themselves to perish by the heat of the hot Bed when the Crop is over.

For Acceleration of maturity in all Wall-fruits, the practice of Midsummer pruning is every where almost observed, which is, the cutting off all parts of the shoots that are grown out far beyond the Fruit, and do otherwise take away both the sap that might advantage the Fruit, and the benefit of the Sun likewise: This operation in Vines is called gelding, and is usually transferred to Pompions, Musk-melons, and Cucumbers, and like Fruits, to accelerate their ripeness: The Joyst beyond the last Cluster or Gourd, is the place where the Creepers or Shoots are to be nipt off in Vines or Gourds: In other Wall-fruit the Gardiner clips them at a convenient distance from the Wall, so as not to take away all the shade from the Fruit, which in some proportion is necessary that the Fruit be not dried up, and burnt upon the Tree by the Torrid heat of the Mid-summer Sun, in such places where his rays are reflected from a Wall or Floor, or both.

'Tis also observed that in Wall-fruit, or any other that requires a reflected heat, in order to the ripening of the Fruit; the lower the Boughs are spread, the sooner the Fruit ripens on a Wall: And in Standards, the lower and nearer the Earth any Plant is kept, the better shall it ripen, by reason of the reflection

fection made from the surface of the Earth ; which if it be bare from Weeds, is equal to the reflection from some Walls. In *France*, Vines have no other reflection but this, being tyed to stakes, and not suffered to grow above a yard high ; and in many places of *England* this only advantage, without Walls, brings Grapes to that maturity which is ordinary in our Island.

The making Orchards of dwarf Trees is used upon the same reason ; for thereby, here in *England*, your *French* Fruit, as the Boon-Cristien Pear, and the like (which otherwise will not bear in this Kingdom except nailed to a Wall) may be produced. And of this the Royal Garden at S. *James*'s is an Example. The contrivance of these dwarf Trees consists principally in these two particulars. 1. The Graffing the stocks very low, and then secondly by cutting off every year all the new shufts or Cyons, except one inch or two of the greater end, which may be enough to bear one or two buds to sprout for the ensuing Summer ; and thus onely keeping the knife from the blossoming Buds, which are easily discern'd by the Gardiner, and may by any one be learnt by the signes above discours'd of, Cap. 8. N. 5. where I have deliver'd the right way of Pruning, and cutting the Cyon ; the diligent Gardiner improves his fruit by keeping his Trees as low as he can ; commonly not above three quarters of a yard in height.

The twisting of the stalks, whereby the Bunches of Grapes are joyned to the Body of the Vine, done at such time when the Grape is come to its full bigness, is practised by some for the accelerating maturity; and it may be, that by this twisting, the Channels that might otherwise carry more crude Sap into the Grape, being broken, the heat of the Sun may more speedily reduce that which is already possessed by the Grape into sweetnes, then if sower and undigested Juice were still supplyed from the Vine.

Retardation, or hindring Plants from running to Seed, is likewise of use for the preservation of the Root and Leaf; for there are many Plants, whose last endeavour being to bear Seed, presently die in all parts of them as soon as the Seed is perfected.

Of this kind are your best Carnations and Gilly-flowers; the hope of whose continuation is only by those slips that are not like to bring Seed the present year; to this kind also belong divers Herbs, such as are Parsely, Scurvy-grass, &c. The Spindles therefore of all such are timely to be cut off, the younger the better, in choice Plants, for fear of killing the Root; and hereby plenty of Branches and Off-sets, or side-Plants, will arise from the old Stem, Stool, Root. Nay, 'tis observed by our Gardeners, as likewise by *Ferrarius*, in his Chapter of the culture of Tulips, That if those Flowers are suffered

to

to grow to Seed, the Bulb thereby is certainly much emaciated, and sometimes utterly perisheth; and therefore on all hands it is counted good to gather Tulips as soon as may be.

Some of the ways of Retardation are generally known, as particularly the experiment of plucking of Rose Buds as often as they spring, until the time you intend they shall proceed to flower; or the making the Branches of the Rose-tree bare of Shoots once or twice in the Spring for this purpose, are not unfrequently practised. And I have been informed by a Person of Credit, that at *Bristol* he saw Raspes sold for four pence the quart at *Michaelmas*, which were thus retarded, by setting the Plants late in moist ground the same year: All which ways, I suppose, may well be transferred to other Plants of like nature, and this last way is not so common. I have before mentioned its use for the retardation of the Flowers of Anemonies.

There is some use of Retardation to all such Plants which so prematurely blossom, that they be subject to blasting by Spring-Frosts; I know nothing used to prevent this annoyance, but the opening of the Root, and suffering the Snow, and Snow-water, to lie thereon and chill the ground; but of the benefit or danger of this remedy, I have no experience.

Num. 8. *Of melioration by Richness, or other convenient Minera in the Soyl, for the feeding and better nourishment of several Plants: Of Artificial Bogs, and the change of Seed, as a means to bring fair Flowers: Of Exoſſation of Fruit, or making it grow without Stones.*

The Lord *Verulam* reckons up the making of rich composts for the Earth, among the *Magnalia Nature*, and most advantagious projects for the use of Man; which richness, if the modern Hypothesis of Chymists be right, consists in good proportions of Salt, Spirit, and Oyl; which are principles generally deficient in barren places: Dry Earth, and cold crude water, or these two mixt together, every where abounding: I say, good proportions, because it is most certain, that no Vegetable will grow in too great abundance of Salt or Spirit, or other violently hot and corrosive matter: Sut and Pidgeons-dung abound much with volatile Salt; and I have this year, upon a cold moist Clay, seen excellent advantage to the Grass thereby, it being onely strewed thin on the Grass before the Spring, but of the two, the Sut was best: upon a dry Sand I should not have expected the like improvement by its mixture, and in these composts themselves by reason of abundance of Salt, without due proportions of other principles mixt, nothing will grow, for there

is no fermentation without mixture of contrary parts of Elements ; and all dunging is in order to fermentation : Hence *Columella* commends Pidgeon-dung, because, sayes he, *Præ ceteris terram facit fermentare*, the earth generally abounding in its own nature, with coldness and moisture, so that the richness in Salt or Spirit, tempers a Soyl well, which is deficient in these principles, for those Vegetables that require in the ground so sprightfull a fermentation. For divers states of ground, and various Fermentations are required to different Plants, nor can any one Soyle indifferently and equally agree with them all according to that of *Virgil*.

*Nec vero terre ferre omnes omnia possunt,  
Fluminibus salices, crassisque paludibus alni  
Nascuntur ; steriles saxosis montibus orni,  
Littora myrtetis latissima : denique apertos  
Bacchus amat colles, Aquilonem & frigora taxi.  
Aspice & extremis domitum, cultoribus orbem  
Eoasque domos Arabum, pictisque Gelonos,  
Divise arboribus patriæ : sola India nigrum  
Fert ebrium, solis est thurea virga sabais, &c.*

*All Grounds can't all things bear: The Alder-tree  
Grows in thick Fens ; with Sallows Brooks agree.  
Ash craggy Mountains: Shores sweet Myrtle fills,  
And lastly, Bacchus loves the Sunny Hills :  
The Tew best prospers in the Northern cold.  
The conquered Worlds remotest Swains behold !*

See

See the Eastern Arabs, the Geloni, these Countries are all distinguish'd by their Trees: The blackest Ebony from India comes, And from Sabaea Aromatick Gums, &c.

*Gassendus (Libro de Plantis cap. 3.)* gives us this Information, That Hog dung doth temperate the Acrimony of Onions, and turneth the sourness of Peaches into sweetnes. And a little after in the same Chapter, That the Minera of the Earth hath so much influence into the Vertues of the Plants that grow thereon; that the Grass and Herbs are Antidotal that grow, and the very Vipers and Serpents are not poisonous that abide upon the Mountains out of which the Bath waters do Spring.

Boggy Plants require, even when they be planted into Gardens, either a natural or artificial Bog, or to be placed near some water, by which there is great improvement to all sorts of Flags, and particularly, as I have observ'd to *Calamus Aromaticus*.

The artificial Bog is made by digging a hole in any stiff Clay, and filling it with earth taken from a Bog; or in want of such clay ground, there may be stiffe Clay likewise brought in, and laid to line the hole or pit in the bottom or floor, and the sides likewise so thick, that the moisture may not be able to get through: Of this sort, in our Physick Garden here in *Oxford*, we have one artificially

ly made by Mr. Bobart, for the preservation of Boggy Plants, where being sometimes watered, they thrive for a year or two as well as in their natural places.

But these Artificial Bogs are not so lasting, but that in two or three years they will begin to decay, For the Clay cracking, and letting the water out, the Boggy Earth being thereby as it were drained, will begin to alter its Nature, and (if I may be pardon'd for the impropriety of the Speech) degenerate into better.

However 'tis true, that there is variety of usage for Plants of different nature, yet for the generality of Plants, they are best improved by a fat, rich, deep, moist, and feeding Soil ; and it is highly his interest that intends a flourishing Orchard, or Kitchin-garden, to improve his ground to the height.

And as there is great diversity of Flowers, so there is some diversity of Soyls, though, as I before intimated, for the generallity of the choicest Bulbous and Tuberous Roots, a mixture of Cow-dung and Sand well rotted, and incorporated together, maketh a convenient Soyl, to which those that are more curious with good success, add towards the top of the Bed (especially where their Seedlings are educated, some of that rotten Earth that is usually found in the bodies of hollow and decayed Willows ; This is most for Tulips, Artemones, Ranunculus's, Crocus's, and the

the like, and is not unsuitable for the best Flowers that have fibrous or stringy Roots, as *July-flowers*, and *Auricula's*, though these may endure a greater proportion of dung in the mixture.

*Stephen Blake*, where he casts off some Experiments as untrue, giveth us a pretty one of his own: I will instance to you, saith he, **what I have done, viz.** I took *Camomil*, *Valerian*, *Flag-roots*, *Celandine leaves*, these beaten together into a *Salve*, and applyed to the Roots of *Gilly-flowers* when they are planted or removed, and watered them with the same. It hath propagated the Flower in bigness, so that it hath made it as big again as any of the ordinary Natural Flowers, and sometimes the colour of them will alter that are thus ordered.

And in his Chapter of the *Crocus* he hath the like Experiment for the melioration of all flowers from bulbous roots: First, saith he, fill some boxes of the finest mould that may be had, and as dry as may be, then put it into Boxes, then set these boxes in some Garret or Room where they may have Sun and Wind, but no Rain come at them, there let it stand for a twelve Month, then get Sheeps-blood, the juice of *Valerian*, *Camomil*, *Mallows*, and *Capons-taile*, mix these juices and Sheeps-blood together, then water the dry Earth with this substance, then take your Bulbous Roots, as *Crocus*, *Tulips*, *Crowns*

Impe-

Imperial, Lillies, Snow drops, and the like, Plant them in these Boxes in their several Times and Seasons, and anoint the Roots with this substance at their Planting, Water them continually with the same, let them have no rain, nor any kind of water, but onely this, but Sun, Wind, and Air enough, otherwise these Plants will corrupt, this done, your flowers will spring out of an exceeding large growth, and produce them very early, and I can possitively say it will make them differ from what they were formerly.

And in his Chapter of Tulips, for the altering their colour, set, saith he, the Red Tulips by themselves, and the white Tulips by themselves, thus take a quantity of Wild or Garden herbs, and Sheeps dung, and Pidgeons dung, beat these Herbs and the Dung together, when this is done, put some of this into the holes where you set your Tulip Roots, anoint the Roots with the same, and set them into the Holes, and put in more on the top of them, cover them with Earth. This being done, it hath altered the colour upon several tryals, some after one manner, and some after another. But still the red and the white carrieth the greatest sway. So Mr. *Blake*, I lately met with his Book, and take so much notice of his Experiments as to intend a tryal of them, though the second seems more like to destroy, then meliorate it.

That wilde Plants may be meliorated by trans-

plantation into better Soyl, and by being set at greater distances, is no more then what was before noted, and agrees with that of *Virgil, Georg. 2.*

*Sponte suâ que se tollunt in luminis auras  
Insecunda quidem, sed leta & fortia surgunt  
Quippe solo natura subest; tamen hac quoq; si quis  
Inserat, aut scrobibus mander mutata sub actis  
Exuerint Sylvestrem animum, cultuq; frequenti,  
In quascunque voces artes, haud tarda sequentur.  
Nec non & sterilis que stirpibus exit ab imis  
Hoc faciet vacuos si sit digesta per agros.  
Nunc altæ frondes & Rami Matris opacant:  
Crescentique admunt fætus, uruntque ferentem.*

*Plants that advance themselves t'etherial Air  
Unfruitful be, but strong they prove, and fair;  
Because they draw their nature from the Soyl:  
But these, if any graft, or shall with toyl  
Transplant, and then in cultur'd Furrows set  
Their wilder dispositions they forget:  
By frequent culture, they not slowly will  
Auswer thy labour, and obey thy skill.  
So they that spring from Roots, like profit yeild,  
If you transplant them to the open Field,  
Which now the Boughs of th'Mother-plant do shade  
And th'Off-sets siop her growth, & make her fade.*

The Seed of wild Cichory that grows every where in the Fields, being sow'd in rich Garden-soyl, is so improved, that we esteem it ordinarily another Plant, and give it the name of

of Garden-Cichory, though indeed they are the same. But besides the goodness of the ground, and greatness of the distances, there may be some advantage to Field-plants, by changing the Seed, by which action the fermentation is supposed to be augmented in the Ground: Now these changes are either from one kind to another, as from Wheat and Barly, to Beans and Pease, which is the usual Husbandry of common Fields, or in the same Seed: Of the former way, *Virgil* gives this Precept.

— *Ibi flava seres mutato fidere farra  
Unde prius letum filiqua quassante legumen,  
Aut tenues fetus Vicia, tristisque Lupini  
Sutuleris fragiles calamos, sylvanque sonantem.*

Georg. I. By Mr. Ogilby thus rendred.

— *There changing Seasons thou shalt Barly sow,  
Where pleasant Pulse with dangling Cods did  
Where brittle stalks of bitter Lupines stood, (grow,  
Or slender Vetches in a murmuring Wood.*

Of changing the Seed of the same kind, besides Field Corn, which is generally changed every third Season at the farthest, examples may be had in Carnations and Gilly-flowers, the Seed of which, being taken from the best Flowers, are much meliorated by alternation and change of Ground; and it is like this Experiment may hold in the seeds of other Flowers.

Ano-

Another Experiment, is the exostation of Fruit, or causing it to grow without stones or core, for which effect, the grafting of the upper end of the Cyon downwards, hath been asserted to be a certain way: That the Cyon so grafted will grow, I have experience; but whether in time they will produce the forementioned effect, I greatly doubt: And if they should, I much mistrust their expectations would not be answered, that intend melioration thereby: For the Fruit, certainly by the loss of the natural Seed, would be very much dispirited, and loose the generosity and nobleness of its nature, as Animals do, and as Vegetables sometimes; as particularly I have observed in Barberries, for I have seen a Tree that bare every year on most Bunches two sorts of Barberries, the one full, and of a deep Red; the other of a pale colour, and thin substance, and inquiring into the case, I found the former to have Stones in them, and the latter destitute, which were, as I supposed, thereby emasculated.

Num. 9. *The conclusion of the Treatise, with one or two choice observations of the wise and good Providence of God, which may be seen in the admirable mark of Vegetables, and fitness to their ends, which are not generally taken notice of, but are, with many more, overseen by men busie in the affairs of the world.*

It

It was the Sin of the Heathen that they did not rise in the exercise of their minds from the contemplation of the beauty of the Creatures, to consider how such Lineaments could be made, and to glorifie thereby the Wisdom of the Maker. The particulars are infinite, that ordinarily to a man exercised in things and thoughts, suggest themselves to avouch the existence of a Providence, and to confute the vanity of the old Epicureans in the simplest of their Tenets concerning the framing of this world, of things by a casual concurrence of small Atomes or Motes intricated in their motion, by meer chance into such beautiful bodies.

It is no unusual Theme to treat of the admirable handsomness and beauty in the composure of divers Vegetables, and to shew how Nature doth ~~herselfe~~ in them, and characterize out such variety of elegant figures, that every Plant shall seem to have more of Mathematical art, than the Knot wherein it is set: And 'tis generally noted, that Gods Providence is exceeding good in appointing Nature, and making it her end to continue some individuals of every Species for the preservation of the kind. That likewise the same Providence has approved to its self a most excellent Wisdom in the choice of most certain means, for the attainment of this end, it has been mine, and may be an easie consideration to any other.

R

For

For what other end, thought I, are there so many coats, and such cotten vesture to seeds, but to defend their tenderness? Why such hard stones to others, but to hinder their premature springing, whereby the coldness of winter would kill (as in Apricots, Peaches, Nectarines, &c.) their tender seedlings? Why is the ground in Woods covered with Moss, but that Nature intended it as a preservation to Seeds fallen upon the Turf in the violence of Winter Frosts? Why has Nature beset shrubs with prickles, but to defend the tender buds in which the hope of future growth is reposed from the browsing of Cattle in the Winter? and that this was the end of Providence in it, may be conjectured from hence, because those shrubs which are not all over thorny, have a guard of Thorns directly upon the bud, and not elsewhere, as if singularly intended for its security. So 'tis seen in the Goose-berry, Hawthorn, Barbery, Locust, all Roses wild and cultivated, that are not all over thorny, so that the thorns are not useless excrescencies as some have supposed, but as profitable as boughs or leaves.

Why have those Plants that bear no Seed with us, as Poplar and Willow, in every bough of any bigness, a propensity of sending forth Roots, by the occasion of which, each branch is made an entire Tree or Plant? or if that faculty be wanting, why then is there so great disposition and forwardness to propagate them-

themselves by off-sets, as in the Elm, Poplars, &c. And where there can be no off-sets, as in Mushrooms, wherefore else has Nature made the Plants propagable by the smallest of their shreds and inconsiderable parts ? Why else is the Indian Fig, that hath no stalk, propagable by its leaf alone ?

Why have Plants such an eagerness to flower and seed, and such an impatience of being disappointed ? if you pull off the bud of the Rose it will spring again, and not onely the Rose, but most other fruits and flowers have the same desire to produce their seeds, and have given occasion to Artists to make hence Rules of Retardation.

Why do the Seeds stick close to the Pedal, by which they are joyned to the stock until they are mature and fit for propagation, and then fall off in the most fit season for due preparation to future growth ?

Why do those Plants that usually die every year, yet if they are disappointed of running to seed, continue to survive many years, even so long till they are permitted to run up to leave seed behind them ? But that they are appointed by the universal Law of Nature, not to desert their order, till they have produced others after their own kind.

Lastly, why are many Seeds at their first ripening so exactly fledged with wings, but that by the wind, they may be carried to such places as may be fit wombs to receive and feed

244 *Buds placed by Wisdom, not by Chance.*

them, until they attain from the being of seeds, the measure and stature of perfect plants.

Another Specimen of the Wisdom of the God of Nature, may be seen in the regular situation of Branches, and the orderly eruption of Buds, upon every Vegetable; for, notwithstanding the report of my Lord Bacon, *Nat. Hist. Cent. 6. Observ. 588.* That *Trees and Herbs in the growing forth of their boughs and Branches, are not figured, and keep no order, but that when they make an eruption, they break forth casually, where they find best way in their Bark and Kind:* I find my self necessitated to refer that to an exceeding Wisdom, which his Lordship refers to chance and casualty: For if I observe aright both Buds, and Leaves, and all eruptions, stand so on every Vegetable, as to serve most fitly for most necessary ends.

As to Leaves, the Learned Doctor *Brown* hath made the Quincunx famous, which may with as great aptness be applyed, and, I think more universally to the scituuation of Buds, or Germens.

This Figure had its name from the numeral Letter *V.* because the points therein, are the same with the points or Angles in the said Letter, and because that as the Letter is capable of infinite Multiplications, so is the Figure, and both in not unlike fashions: The number thus, **V. XX. XXX.** the Figure thus,

thus, . . . . .

Of this Quincunx I shall propose three sorts. 1. The thicker, as in the Figure *a*. The thinner and less full of points, are either obliquely set, as in the Figure *b*. or more strait, as in the Figure *c*.

The most thick sort of Quincunx hath its examples rather in Leaves then Buds, for after this manner stand the Leaves upon most Martagons and Lillies, divers Spurges, and Sedums, on which it is most visible, when the Plants run up to Seed. Trickmadam, Spurge-Laurel, Marsh-mallows, when the stock is exceeding ranck and big, for otherwise it is sufficed with the regulations of the third Figure: The leaves of Fir-tree, Pine-tree, &c.

The second, or oblique, and single Quincunx, may for the most part be observed, both

in the Buds and Leaves that arise from Trees, and such other Plants whose stalks are round; as in the Oak, Elm, Hasel, Apples, Plums, Cherries, Pears, Willows, Sallows, Osiers, Black-thorn, White-thorn, Goose-berries, Currants, Roses, Fennel, Cichory, Thistles of most sorts, Docks, Bur-docks, Sothern-wood, Rue, Seseli-Æthiopicum, Sweet-maudlin, Common-mercury, Dulcamara.

I find indeed the Learned *Gassendus* to have put Apples among those Plants whose leaves arise from the stalk without order. *Prodeunt folia in quibusdam sine ordine ut in Malis in quibusdam Ordinate ut in Rosâ.* But every mans Eye that marketh the situation of the Buds upon any fresh shoot of an Apple that sustains Buds enough to admit the Quincunx, will be satisfied that I have not erred in my Observation: Nor do I account it an Error that I affirm the Buds of Roses and Apples to observe the same manner of the Quincunx. The cause why *Gassendus* Observation differs from mine is: First, that He observed not the Figure of the Eruption of the Buds in Apples, nor in Truth in Roses. Secondly, his Notion of a leaf and mine is different, I take those parts for several divisions of the same leaf which He accounts for distin&t leaves: For whatsoever stands upon that stalk which covers the Bud, is in my account part of the same leaf, because these parts all meet together in one Stalk, fall together in the Winter, and the edges of the stalk

stalk seem dilated at the end where it joynes to the stemme of the Tree, as if purposely figured for the safety of the Germen or Bud: And the like divisions of Leaves may be seen in divers other Plants: as in Tansy, Celadine, Argentine, Agrimony, Valerian, and in divers leaves of Trees, as in the Ash-tree, Wallnut, and very many others. And if any one would obserue the order of leaves, what I have set down here of Buds, will give him light in his Enquiry. For though not always, yet it most commonly holds, that the leaves and Buds stand in the same order; One great end of the stalk of the leaf, and leaf it self, being to defend the tender Bud from the Violence of the Summer heat.

The third direct, and oblong Quincunx, is most observed in Plants of a square stalk, as Water-betony, Fig-wort, Lavander, Mints, St. Johns-wort, Clowns-all-heal, Rhus-Myrtifolium, Mother-wort, Nep, Colus-Jovis.

Yet 'tis not unfrequently seen on other Stalks also, as the Sycamore, Elder, Maple, Dog-tree, Ash, Hysope, Nettles, Hemp, Willow-weeds, Tree-Spurge, French-Mercury, Scammony of Montpelier.

And it is to be observed, that in divers of those Plants whose Stalks are set with Joynts, and those Joynts with a beautiful Circle of Leaves, proper to each Plant, contrary to the Quincuncial scituacion, the Germens, notwithstanding, are found to follow the order

of this last mentioned Quincunx, as may be seen in Madder, Goof-grass, Ladies-Bed-straw.

Or if that order be left, yet it is not left to the disadvantage of the Plant, but generally it hath in exchange some other handsome and proper method of Leaves and Buds. Thus *Linaria-Quadrifolia*, hath on each joyned three, four, five or six opposite Leaves, and under each leaf a Germen, which arise to Branches, uniformly set upon the same round Stalk.

And as to the particular make and frame of those Plants, which in the standing of their Leaves cannot be said to follow the order of any Quincunx, yet they, instead of those elegant Tessellations, are beautified otherwise in their sight with as great curiosity. I cannot think of a Plant, according to the ordinary estimation of men, that is more contemptible than that which grows ordinarily in Bogs, or miry Ditches, and is called Great-Horse-tail; yet if any man please to disartuate the whole, and take particular view both of the parts and conjuncture, they will find the frame exquisite enough to deserve a better esteem; for both stalks and leaves are made up of divers pieces, framed, as it were, in joyned work; all which pieces bear exact proportion each to other; and each receives other bidented terminations, which form very beautiful Coronets on the pieces so received; then at a convenient distance, above each of these Coronets,

ronets, there ariseth a very beautiful Circle of Leaves, and these very leaves are made up of hollow peices articulately, and proportionably joyned, in imitation of the elegancy of the joyns of the stalk it self.

And generally the Leaves that stand not according to the Quincunx, either stand in joynts, in the fashion of the Burgonian Cross, as on Cross-wort; or in a Circle, as on most sorts of Madder, Ladies-bed-straws, Wood-roofs; or in some other profitable, fit and beautiful posture: And though in these creeping and entangled Plants, irregularities are not unfrequently seen, yet even in these irregularities themselves, there often seems to be a greater curiositie, and most proper order; as particularly, Madder is generally tetragonal, and notwithstanding its circular border of Leaves, usually sends forth Buds, according to the manner of Mints, and other Plants of a four-square Stalk: This I have sometimes seen in many of its Branches to vary and turn hexagonal, or to have a stalk with six ribs, upon which declension the order of the Germens was thus most fitly altered; upon each rib or angle there was always one leaf, and upon every other rib, a German under the leaf; which I found so placed, that no one rib did bear the Bud in the two succeeding joynts; so that if in the first joynt, the three Buds stood on the first, the third, and the fifth ribs, then in the second joynt,

the

250 *Of other Figures besides the Quincunx.*

the Buds stood on the second, the fourth, and the sixth, and so interchangably to the very top.

Now by these Scituations of the Buds, according to these Observations, it always is so found necessarily to be, that if two buds stand on the same joyn, as in the third Quincunx; those that stand on the same heighth, keep always the contrary sides; and further, if the two lowermost stand North and South, the two next immediately above them stand East and West. And in the second, or oblique and single Quincunx, when the buds stand not two at the same heighth, the second stands on the opposite side to the first, and the fourth to the third; and then likewise, if the first and second stand East and West, the two next above them stand North and South.

I may give notice, that to find these methods, and to expose them to the eye, a profitable way may be to clip off the stalks of the leaves near the branch, especially in the first and most thick sort of Quincunx; in the second more single Quincunx, it may not be amiss to slit the bark and take it off, for it being laid plain and flat, the Quincuncial order will the better appear; the third sort is visible to the eye, as the Plant grows.

Care also must be had, that observation be made on such Plants whose stalks are not twisted, for the twisting of it brings the Leaves and Germens out of order: There may besides

sides these, some other methods appear not here mentioned, but even in them, he that pleases to consider them, I doubt not, will find constancy for the most part to their rule; or if they have no rule, there may likewise a reason be found why it was good they should be without.

I might also instance in other Excellencies, which some observe in the formation of Plants, as particularly that of the tendrels of Vines, Gourds, Kidny-beans, and other sorts of Pease, and of Plants of the like Natures, which are so pretty, and so dextrously used to the upholding those sorts of Vegetables, that the Wit and Art of Man could not have devised any thing more fit for the use, or neat for the contrivance.

But it is most certain, that these are the general methods, and these contrivances of the eruption of Buds, serve for divers excellent ends exceeding fitly, and so are arguments, (how poor and inconsiderable soever these Observations may seem) that they came not out by the lucky justlings and stumbling of blind chance, but by the Providence of a most Powerful, Skilful, and Wise Artist and Author. For they serve first to procure a fit and proportionable shade for the Stalk and Fruit; neither of which in their tenderness, can endure the scorching Sun-beams, for by keeping this method and order, they communicate their shade to all parts of the Tree  
or

252 *The use of such order in eruption of Buds.*

or Plant ; whereas, should they break out in a disorderly fashion, some parts of the Plant, and some Fruit, would be exposed to all weather, where no Buds or Leaves come forth ; other parts would be too much shadowed by the too thick eruption of Buds. This order likewise sets out the boughs and branches of each Tree into such positions, that one may not easily tread upon another, or gall its neighbour, but grow in a distinct room, every branch having his proportionable allowance in that circumference which the whole Tree takes up, whereby it may, without any impediment to others, grow to a convenient bigness ; otherwise came many Buds out together without method, they could never arrive at any bigness in their future growth, nor attain to good Fruit, or pleasant Leaves and Flowers, but would run out into such thick Crows-Nests, as I have observed sometimes to happen in Plum-trees by an Error or mischance of Nature, in the parturition or bringing forth of the Germens. The observation likewise of these methods, must needs be of use to the Equilibration and uprightness of Trees, for should all the boughs break out in one place, or on one side, the heaviness of that side or part, would bend down the body into a crookedness, and deprive it of that uprightness and straitness, which is the most useful site of most Plants ; and those that are without these regulations, are generally such

as

as are made to grow upon, and twist about other things, and not to bear up themselves, as Bind-weeds, and the like.

And now I am come thus far, there comes into my mind that excellent Animadversion which the most wise King made, when he had considered the several Purposes, Travels, Businesses, Changes, and Overtures, which happen to us poor men while we are under Heaven, in their several Seasons ; as particularly, in the days of our Birth, and the days of our Death, in the days of our Planting, or being Planted, and those of our Plucking, or being Plucked up : When Men get and Increase their Estates, and when they Loose, grow Bankrupt, and are undone ; in the dayes of their Jollities, Dancings, Lovings, Wooings, and Embracings ; as likewise in those cloudy and dull Seasons, when satiety of Enjoyment, indisposition of Body, or other unhappy accidents, has begot Pevishness and Loathing ; and when Tears and Mourning contristate all their glory and beauty : Concerning the seasonableness and fitness of all the Estates of men, their condition, accidents and disasters in their several times, This is his observation, *Eccl. 3. That he had seen the travel which God had given the Sons of men to be exercised therewith,* and found, that God by his Providence had made every one of the things made, beautiful in its time : Moreover, that he had set the age in the middle of them, yet so, that no man of them

254 *The End that we rejoice for them,*  
*can find out the work that God maketh from the be-*  
*ginning to the end.*

I shall not Apologize for Translating  
**העלם** *בלבם* the age or in the middle of  
them, because I know the words, and me-  
thinks the sense and context bear it best, but  
shall beg leave by a parallelism to apply it to  
the present matter; the placing, not the  
timing of things, and to express my thoughts  
thus: That God has made every thing beau-  
tiful in its place, order and scituation, and  
particularly every part of every Vegetable,  
and has also set the world so curiously  
wrought and modell'd, in the middle of us,  
yet so, that by reason of our various affairs  
and businesses, and other fancies, no man can  
find out the work that God hath made from  
the beginning to the end.

Lastly, I must beg leave to make the same  
conclusion and Appendix to the Observation,  
that the King has there appos'd to his, (viz.)  
That the true and only use that can be made  
of those Elegancies and Beauties, which in  
every aspect suggest themselves unto us, is no  
other, but that we *Rejoyce in them*, and in their  
Maker, *and do good in this life*. I mean, that  
we puzzle not our selves over-much, nor dis-  
cruicate our Spirits to resolve what are the  
causes, and what the manner of causation of  
the apparent effects of Gods great Power,  
any further then as our labour may serve for  
those excellent and firmly together interwo-  
ven

ven ends of rejoicing and doing good, and the rather, because of the experiment which this most wise Prince, who was helpt by the great Riches of his then puissant Kingdome, (and so not impeded by those wants that usually discomfit private persons in such enquiries) made himself and published concerning his own search, Eccl. 1. *That he gave his heart to seek and search out by Wisdom concerning all things that are done under Heaven, and found this to be a sore Travail, that God had given the Sons of men to be exercized therewith.* And further, *That with much Wisdom, there is much Vexation, and he that increaseth Knowledge, increaseth Sorrow.*

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*Thomas, Earl of Offaly*, then Lord Deputy of *Ireland*,  
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*Dublin*, 1670.

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Mr. Boyle's 2 Vol. of his Experiments of Air, with many Figures engraved on 8 Brass Plates. Also his Treatise of the Atmospheres of consistente Bodies. 1669.

A Sermon Preached at a Visitation at *Grantham* in the County and Diocese of *Lincoln*, 8 Octob. 1641. on Mar. 15. 9. by the Right Reverend Father in God, *Robert Sanderson*, late Lord Bishop of that Diocese, in Folio and Quarto. 1671.

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*Tabula Longit. ac Latitud. Stellarum Fixarum, ex Observacione Ulugh Beighi Tamerlanis Magni Nepotis, ex MSS Persicis, jam primum Luce ac Latio donavit, & Commentaritis Illustravit Tho. Hyde, A. M. Coll. Regina, ac Probabiliothec. Bodleian. apud Oxon. 1666.*

*Oxonium. Poema, per J. V. Ex Aede Christi.*

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*Mayo de Respiratione, & Rachitide, 1669.*

*Scheibleri Compend. Philos. Edit. Nova. 1671.*

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*Nemesius de Natura Hominis, Gr. Lat. 1671.*

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